



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**GETTING THE MESSAGE ACROSS: AN ANALYSIS OF
FOODBORNE OUTBREAK COMMUNICATIONS
BETWEEN FEDERAL, STATE, AND LOCAL HEALTH
AGENCIES**

by

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June 2016

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE June 2016		3. REPORT TYPE AND DATES COVERED Master's thesis
4. TITLE AND SUBTITLE GETTING THE MESSAGE ACROSS: AN ANALYSIS OF FOODBORNE OUTBREAK COMMUNICATIONS BETWEEN FEDERAL, STATE, AND LOCAL HEALTH AGENCIES			5. FUNDING NUMBERS	
6. AUTHOR(S) Michèle Samarya-Timm				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____N/A____.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) <p>To assure coordination of emergency response across multiple areas of responsibility, clear methods of communication between public health agencies need to be defined before responding to foodborne outbreaks. Such capacity is essential to assure the United States can satisfy its goal of achieving an Integrated Food Safety System, as mandated under the 2011 Food Safety Modernization Act. With this in mind, a comparative analysis was conducted of 21 states' general operating procedures to ascertain lines and modes of communication related to foodborne outbreaks, evaluate for procedural commonalities and best practices, identify potential barriers to effective communication, and make recommendations to enhance multi-directional coordinated information exchanges among health agencies.</p> <p>The analysis identified that while all states included recognize the value of a prompt response in disease identification, investigation and control, coordinated communication strategies within and between affected public health agencies is less robust. Many protocols are vague in establishing parameters for what information can be shared with other agencies, and under which circumstances. A multitude of electronic portals exist for collaborative purposes; however, these resources are not centralized.</p> <p>Recommendations for systemic improvement include expanding the current food protection rapid-response teams to all 50 states, assuring that formalized inter- and intra-agency communication plans exist in every outbreak response protocol, assuring the Incident Command System is explicitly stipulated in every regulatory outbreak response plan, and establishing funding opportunities for county and local health agencies related to communication training and system enhancements for collaborations in the midst of an outbreak.</p>				
14. SUBJECT TERMS food safety, food defense, food terrorism, emergency response, outbreaks, communication, FSMA, IFSS, public health, ICS			15. NUMBER OF PAGES 185	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified		18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified		19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified
				20. LIMITATION OF ABSTRACT UU

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OUTBREAK COMMUNICATIONS BETWEEN FEDERAL, STATE, AND
LOCAL HEALTH AGENCIES**

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Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

To assure coordination of emergency response across multiple areas of responsibility, clear methods of communication between public health agencies need to be defined before responding to foodborne outbreaks. Such capacity is essential to assure the United States can satisfy its goal of achieving an Integrated Food Safety System, as mandated under the 2011 Food Safety Modernization Act. With this in mind, a comparative analysis was conducted of 21 states' general operating procedures to ascertain lines and modes of communication related to foodborne outbreaks, evaluate for procedural commonalities and best practices, identify potential barriers to effective communication, and make recommendations to enhance multi-directional coordinated information exchanges among health agencies.

The analysis identified that while all states included recognize the value of a prompt response in disease identification, investigation and control, coordinated communication strategies within and between affected public health agencies is less robust. Many protocols are vague in establishing parameters for what information can be shared with other agencies, and under which circumstances. A multitude of electronic portals exist for collaborative purposes; however, these resources are not centralized.

Recommendations for systemic improvement include expanding the current food protection rapid-response teams to all 50 states, assuring that formalized inter- and intra-agency communication plans exist in every outbreak response protocol, assuring the Incident Command System is explicitly stipulated in every regulatory outbreak response plan, and establishing funding opportunities for county and local health agencies related to communication training and system enhancements for collaborations in the midst of an outbreak.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFCEA	Armed Forces Communications and Electronics Association
APHIS	Animal and Plant Health Inspection Service
APHL	Association of Public Health Laboratories
CaliciNet	National Electronic Norovirus Outbreak Network
CDC	Centers for Disease Control and Prevention
CDRSS	Communicable Disease Reporting and Surveillance System
CIFOR	Council to Improve Foodborne Outbreak Response
COE	centers of excellence
CoreSHIELD	Common Organizational Registry Environment SHIELD
CRS	Congressional Research Service
CSTE	Council of State and Territorial Epidemiologists
DETECT	Decrease Epidemiological Threats with Environmental Controls and Testing
DHS	Department of Homeland Security
DNA	deoxyribonucleic acid
DOD	Department of Defense
e-SAF	Electronic State Access to FACTS
eFORS	Electronic Foodborne Outbreak Reporting System
EH	environmental health
eLEXNET	Electronic Laboratory Exchange Network
Epi-X	Epidemic Information Exchange
ESF	emergency support function
FACTS	Field Accomplishments and Compliance Tracking System
FBDO	foodborne disease outbreak
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FERN	Food Emergency Response Network
FNS	Food and Nutrition Service
FoodCORE	Foodborne Diseases Centers for Outbreak Response Enhancement
FoodNet	Foodborne Diseases Active Surveillance Network
FPDI	Food Protection and Defense Institute
FSIS	Food Safety and Inspection Service
FSLT	federal, state, local, and territorial
FSMA	Food Safety Modernization Act
FSWG	Food Safety Working Group
GAO	General Accounting Office

HACCP	Hazard Analysis Critical Control Point
HAN	Health Alert Network
HHS	U.S. Department of Health and Human Services
HIPAA	Health Insurance Portability and Accountability Act of 1996
HSIN	Homeland Security Information Network
HSPD	Homeland Security Presidential Directive
HSPD-5	Homeland Security Presidential Directive 5
HSPD-9	Homeland Security Presidential Directive 9
HUS	hemolytic uremic syndrome
IAFP	International Association for Food Protection
ICS	Incident Command System
IFSAC	Interagency Food Safety Analytics Collaboration
IFSS	Integrated Food Safety System
InFORM	Integrated Foodborne Outbreak Response and Management
ITF	IFSS Task Force
NACCHO	National Association of County and City Health Officials
NCFPD	National Center for Food Protection and Defense
NEHA	National Environmental Health Association
NIMS	National Incident Management System
NJACCHO	New Jersey Association of County and City Health Officials
NNDSS	National Notifiable Disease Surveillance System
NORS	National Outbreak Reporting System
NRF	National Response Framework
ORA	Office of Regulatory Affairs
PFP	Partnership for Food Protection
PHIS	Public Health Information System
RRT	Rapid Response Team
SAFES	State Advisory Fax and Email System
SOG	standard operating guideline
STEC	Shiga Toxin-producing <i>Escherichia coli</i>
STLT	state, tribal, local, and territorial
USDA	United States Department of Agriculture
WHO	World Health Organization

EXECUTIVE SUMMARY

A. INTRODUCTION

The United States public health system, including agencies at the federal, state, and local levels, is charged with protecting citizens from illness due to food. While working toward this protective oversight, public health professionals are challenged by an increasing frequency of multi-jurisdictional outbreaks. Effective communication and crucial information sharing between public health agencies is essential to assure unified and rapid identification and response to epidemics attributed to food.

Local public health professionals rely on communications systems established by federal and state oversight agencies. Most commonly, if a verified or suspect foodborne contamination or outbreak has occurred, the Centers for Disease Control and Prevention (CDC), the U.S. Department of Agriculture, or the U.S. Food and Drug Administration (FDA) will ascertain the appropriateness of information release.¹ If this information is deemed credible, notification is forwarded individually or en masse to state departments of health. The states, in turn, push this information down to local regulators.² Each step in the process contains elements that may delay the rapid dissemination of outbreak information. The ability and willingness of all stakeholders to quickly and readily share incident particulars with fellow responding agencies can enhance investigation effectiveness and amplify response efforts.³

Delays in the prompt notification between public health partners can result from the federal agencies desiring a certain level of correlation between a particular food source and the reported illnesses. Data sharing is difficult because federal agencies are legally prevented from sharing certain data. As a result, state and local public health officials may hear about foodborne disease issues first from other sources, such as the

¹ “Investigating Foodborne Outbreaks,” last updated March 17, 2016, <http://www.cdc.gov/foodsafety/outbreaks/index.html>. <http://www.cdc.gov/outbreaknet/investigations/>.

² Ibid.

³ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response* (Atlanta, GA: Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, 2009), 152.

media, word of mouth, public complaints, or the food industry.⁴ In addition, the desire of some states to have their own logos and contact information on the notifications can cause further delays in information dissemination. Slow notification can inhibit timely response efforts, and increase the likelihood of additional illness.

Although national recommendations for notifications do exist, some outbreak reporting depends on state and local requirements. Some public health departments lack the resources to provide rapid access to communications, or staff to consistently monitor the same. Anecdotal reports of current communication strategies and governmental efforts provide an extremely unbalanced approach to essential information sharing.

With this in mind, this research examined states' general operating procedures to ascertain lines and modes of communication related to foodborne outbreaks, determine procedural commonalities, identify potential barriers, and make recommendations to enhance multi-directional information exchanges between health agencies. The implications of this study for improving policy, inter-agency communications, and foodborne outbreak notification dissemination are significant. Creating a picture of the status of foodborne disease outbreak communications lays a foundation for gap analysis and performance comparison, and identifies areas for functional improvement. Addressing these issues can improve the two-way flow of information for food protection issues, and may be applicable to other areas where federal, state, and local agencies need interactive communication.

Directions for foodborne outbreak response exist in collaborative proceedings, such as the Council to Improve Foodborne Outbreak Response (CIFOR) guidelines; however, exact assignments for managing outbreaks are state-specific. The variability observed in states' approaches was conspicuous, especially in the areas of outreach and communication. References to the Incident Command System (ICS) is lacking in all but a few states' documents. A well-designed communication plan with a focal spokesperson helps to prevent unnecessary duplication, mixed messages, and avoidable delays. This area should be formalized in written response plans, and have enough specificity to

⁴ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 152.

assure appropriate and timely notifications to all who should be included in the outbreak response conversation.

As foodborne outbreaks are often a rapidly evolving and sometimes confusing situation, all agencies should maintain a written, defined, specific, clear, and understood communication plan as part of their foodborne outbreak protocols to reduce the likelihood of two-way information transmission delays with public health. The interplay of people and agencies involved in a local or state response necessitates all public health response staff be trained on how information needs to be exchanged, how this exchange will occur, who is the person or agency responsible for the delivery of the message, and how to confirm the message has been received and understood. Designating key staff for inter- and intra-agency communication helps to assure work is not being done in isolation. As outbreak response teams may vary in different jurisdictions, roles and responsibilities may overlap. Communication guidelines should specify how to incorporate partners that could be involved, and outline when and how to share specific information.

B. RECOMMENDATIONS

In responding to foodborne outbreaks, effective communication guidelines and strategies are essential for public health agencies to assure situational awareness and interoperability. Based on the content of the states' foodborne outbreak protocols reviewed for this research, a summary of recommendations includes the following.

1. Review and Update of Outbreak Communication Protocols

It is strongly recommended that all jurisdictions review and update their procedures on an annual basis. It is especially imperative for those agencies with older documents to scrutinize urgently and update their procedures to assure the best possible response to an outbreak.

2. Communication Enhancements

Coordinated response, especially in multi-jurisdictional foodborne outbreaks, can best be attained if all personnel are working with the same playbook. Just as the FDA

Food Code is a model document that states are strongly encouraged to adopt for synergy in protecting the food supply, the CIFOR guidelines should similarly be widely endorsed and adopted by all states for functional coaction in outbreak response. Communication is an essential element in outbreak investigations. In addition to including planning components from the CIFOR guidelines, states' plans should also incorporate prescriptive, but flexible elements to optimize the use of operational resources and assure enhanced information transfer.

3. Incident Command System

Public health agencies throughout the United States, to maintain compliance with the National Incident Management System (NIMS), are required to utilize ICS principles to coordinate a public health emergency response. As ICS is a national standard for communication during emergencies, and provides the structure for management, reporting and response, use of this system should be stipulated in the text of every outbreak action protocol. Familiarity with ICS principles and widespread application during foodborne outbreaks can help prevent or solve a variety of communication concerns in multi-disciplinary and multi-agency responses.

4. Regionalized Expertise

Local health agencies are the first line of defense in foodborne outbreaks. Nevertheless, resources and multi-disciplinary personnel are often strapped at this level. A regionalized approach for food safety expertise is a prudent way of addressing this gap, and the federal government has appropriated funding for cooperative agreements in this area. Ideally, every state should have its own rapid response team (RRT) for more rapid response and coordination to outbreaks. Funding for additional centers of excellence (COEs) and RRTs to create a more robust regional approach would provide additional resources to assist with the burden of foodborne disease, and allow for greater integration with the thousands of local health agencies serving the nation.

5. Training

As illustrated in this research, many professional disciplines and professional competencies are involved in the investigation and control of communicable diseases stemming from the food supply. Assuring the skills of the public health workforce in outbreak response is core to a rapid and integrated response to foodborne outbreaks.

Health agencies should be encouraged to provide instruction and practice on interdisciplinary outbreak response, and reduce barriers to collaboration and communication. Such training should be offered not only to the primary outbreak response professionals (environmental health specialists, epidemiologists, and laboratory personnel), but also to specialized professionals (health educators, public health nurses) and administrative and support staff, so they can be prepared to act and assist when a large-scale outbreak occurs. Funding opportunities for training and enhancements are often targeted at state-level agencies or health departments of larger cities or states. Such opportunities should be more widely available to smaller health agencies to identify and create best practices from a bottom-up approach.

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ACKNOWLEDGMENTS

The way a team plays as a whole determines its success.

~ Babe Ruth

My most sincere appreciation goes to the Somerset County Board of Chosen Freeholders and the Somerset County Administration, who supported with confidence my participation in the Naval Postgraduate School Center for Homeland Defense and Security program.

It is beyond gratifying to work for an entity that regularly fosters employee enthusiasm and remains true to the county mission statement of providing “effective, efficient and responsive leadership.”

Somerset County, particularly the director of health, continually provides me with the latitude and encouragement to innovate, design and apply programs, policies and initiatives that serve to benefit our residents. You allow me to live and breathe the application of public health, and for that, I am personally and professionally grateful.

Much appreciation to the staff at Somerset County Department of Health who recognize that public health takes a team effort.

Good teachers know how to bring out the best in students.

~ Charles Kuralt

I wish to express my thanks to, and respect for, the staff and instructors of the Center for Homeland Defense and Security, as well as the members of Cohorts 1105 and 1106. You succeeded in igniting my brain and fostered in me new ways of applying critical thinking to public health challenges.

In addition, I appreciate the efforts of my thesis advisor, John Rollins, and second reader, Lisa Massey, who saw the potential in my thesis proposal and stayed with me throughout the journey.

I get by with a little help from my friends.

~ John Lennon/Paul McCartney

There is a cadre of public health professionals who are beyond dedicated and work tirelessly to assure food safety. These folks are true super heroes, laboring daily to protect our food from microscopic terrorists. This thesis was strengthened through the regular insight and feedback from these food safety Super Friends, who all are supportive of enhancing inter- and intra-agency collaboration. Any value that comes from this thesis should be partially credited to them.

I am indebted to the multitude of food safety professionals who provided thoughts, guidance, and advice—especially the two dozen or so current and former federal employees who wished to remain anonymous. You each exemplify what it means to be dedicated to the profession.

This thesis would not be complete without an acknowledgement to barfblog.com, whose authors frequently and successfully push the boundaries of food safety communication.

Most especially, an exuberant standing ovation to Jason Bashura, a great public health Super Friend, whose enthusiasm and dedication to food safety makes me look asleep, as he tirelessly continues to foster multijurisdictional networking and collaboration.

**The happiest moments of my life have been the few which I have past
at home in the bosom of my family.**

~ Thomas Jefferson

Through every moment of this endeavor, the love of my life provided me with unwavering support, love, and coffee. And more coffee. Did I mention coffee? Andy, you have my heart. SHMILY. I promise I will wait a year before starting my next degree. Hold me to that.

Love to my parents. I am still not sure my mother can explain what I am working on. ☺

And to Catie, Monkee, and Mitshu, thanks for providing humor and keeping me sane.

**To succeed, you need to find something to hold on to, something to
motivate you, something to inspire you.**

~ Tony Dorsett

To the people of Franklin Township and Somerset County, through my entire career, you have always been the inspiration for my work in public health, and every day continues to be a privilege and pleasure serving you. You are why I do what I do.

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I. INTRODUCTION

The United States public health system, including agencies at the federal, state, and local levels are charged with protecting citizens from illness due to food. While working toward this protective oversight, public health professionals are challenged by an increasing frequency of multi-jurisdictional outbreaks. Effective communication and crucial information sharing between public health agencies is essential to assure unified and rapid identification and response to epidemics attributed to food.

To assure coordination of emergency response across multiple areas of responsibility, clear methods of communication between health agencies needs to be definitive before a foodborne crisis. Establishing outbreak response guidelines falls to the direction of state and local health agencies. This hierarchy can lead to variations in how inter- and intra-agency information exchange occurs. Incorporating communication expectations in standard operating procedures for foodborne outbreak investigations can prevent confusion and unintentional delays, and achieve enhanced efficiency and effectiveness in a collaborative response.

This research examines states' general operating procedures to ascertain lines and modes of communication related to foodborne outbreaks, determines procedural commonalities, identifies potential barriers, and makes recommendations to enhance multi-directional information exchanges between health agencies.

A. PROBLEM STATEMENT

The sharing of information between public health and food-regulatory agencies is essential to assure appropriate and rapid response in foodborne outbreak investigations, and to prevent the spread of disease.¹ Local public health professionals rely on communications systems established by federal and state oversight agencies. Most commonly, if a verified or suspect foodborne contamination or outbreak has occurred, the

¹ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response* (Atlanta, GA: Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, 2009), 152.

Centers for Disease Control and Prevention (CDC), the U.S. Department of Agriculture, or the U.S. Food and Drug Administration (FDA) will ascertain the appropriateness of information release.² If this information is deemed credible, notification is forwarded individually or en masse to state departments of health. The states, in turn, push this information down to local regulators.³ Each step in the process contains elements that may delay the rapid dissemination of outbreak information. The ability and willingness of all stakeholders to share incident particulars quickly and readily with fellow responding agencies can enhance investigation effectiveness and amplify response efforts.⁴

Delays in the prompt notification between public health partners can result from the federal agencies desiring a certain level of correlation between a particular food source and the reported illnesses. Data sharing is difficult because federal agencies are legally prevented from sharing certain data. As a result, state and local public health officials may hear about foodborne disease issues first from other sources, such as the media, word of mouth, public complaints, or the food industry.⁵ In addition, the desire of some states to have their own logos and contact information on the notifications can cause further delays in information dissemination. Slow notification can inhibit timely response efforts, and increase the likelihood of additional illness.

Although national recommendations for notifications do exist, some outbreak reporting depends on state and local requirements. Despite modern technology, some agencies rely on the U.S. mail and paper copies for official outbreak reports. In addition, some public health departments lack the resources to provide rapid access to communications, or staff to monitor the same consistently. Anecdotal reports of current communications strategies and governmental efforts provide an extremely unbalanced approach to essential information sharing.

² “Investigating Foodborne Outbreaks,” last updated March 17, 2016, <http://www.cdc.gov/foodsafety/outbreaks/index.html>.

³ Ibid.

⁴ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 152.

⁵ Ibid.

Documenting the lines of communication for the flow of routine and emergent foodborne outbreak information between federal, state, and local public health officials, as well as identifying alternate information sources, can create a picture of established communication channels. Currently, no assessment is done of the format and process for how agencies receive their information. Gathering and analyzing this data can create a full picture of the status of foodborne disease outbreak communications, lay a foundation for gap analysis, performance comparison, and identify areas for functional improvement.

B. RESEARCH QUESTION

This study addresses the following two primary research questions:

- How do the current foodborne outbreak information and communication systems function between federal, state, and local health agencies?
- In what ways can the current foodborne outbreak communication system (strategy, policies, and processes) be improved?

Through the data collection and analysis process, this research seeks to explore these areas:

- How do public health professionals receive foodborne outbreak information?
- What strategies and policies are currently in place for federal, state, and local foodborne outbreak information dissemination?
- What processes and technologies are being used to support these communications?
- Do delays or barriers exist in the communication process? Where?
- Can the current strategy, policies, and processes be improved to allow for foodborne notifications to be disseminated in a more efficient fashion?

This research seeks to create a blueprint of communication practices used in the investigation of foodborne disease by reviewing existing state-level policies and protocols. With this approach, the researcher hopes to discover insights regarding factors that enhance or impede foodborne outbreak communications. Information from the protocol review is analyzed and synthesized to develop a picture of the outbreak

communication system, and to provide conclusions and recommendations applicable to the research questions.

C. SIGNIFICANCE OF RESEARCH

The implications of this study for improving policy, inter- and intra-agency communications, and foodborne outbreak notification dissemination are significant. In terms of research, understanding problems or gaps in communications between federal, state, and local regulators, creating a more complex picture of what elements contribute to it, and how it impacts public health is valuable. Gathering this data can create a full picture of the status of foodborne disease outbreak communications, and lay a foundation for gap analysis, performance comparison, and identify areas for functional improvement. Addressing these issues can improve the two-way flow of information for food protection issues, and may be applicable to other areas where federal, state, and local agencies need interactive communication.

II. THE CRITICALITY OF FOOD SAFETY AND FOOD DEFENSE

For the life of me, I cannot understand why the terrorists have not attacked our food supply because it is so easy to do.

~ Tommy Thompson, former Secretary of the
U.S. Department of Health and Human Services

A. LITERATURE REVIEW

Ensuring the safety of the U.S. food supply and prevention of foodborne diseases is a primary function of public health.⁶ In recent years, especially since 9/11, threats to food safety constitute a growing concern,⁷ and have broadened the scope of protective oversight by regulatory professionals working in this arena.⁸ Just as food can be grown in backyards or sourced far away, similarly, foodborne outbreaks can cover small geographical areas or be spread across a larger landscape.⁹ Regardless, the first indicator and usually the first response to an incident is a local one.¹⁰ The skills and abilities of this nation's food safety regulatory workforce are essential to the rapid identification and response to a situation at hand.¹¹ Further, timely communications with the appropriate agencies through previously established channels are essential for surveillance and

⁶ Federal Emergency Management Agency, *Emergency Support Function #8—Public Health and Medical Services Annex* (Washington, DC: Federal Emergency Management Agency, 2008), 1; Institute of Medicine and National Research Council, *Ensuring Safe Food: From Production to Consumption* (Washington, DC: National Academies Press, 1998), 3.

⁷ World Health Organization, *Terrorist Threats to Food: Guidance for Establishing and Strengthening Prevention and Response Systems* (Geneva: World Health Organization, 2008), 9; Emma Hartnett, Gregory M. Paoli, and David W. Schaffner. "Modeling the Public Health System Response to a Terrorist Event in the Food Supply," *Risk Analysis* 29, no. 11 (2009): 1506.

⁸ U.S. Government Accountability Office, *Federal Oversight of Food Safety FDA's Food Protection Plan Proposes Positive First Steps, but Capacity to Carry Them Out Is Critical* (GAO-08-435T) (Washington, DC: U.S. Government Accountability Office, 2008), 2.

⁹ Gerald Wojtala et al., "Global Food-Local Outbreaks," Webcast GFLOA0407, *Michigan Center for Public Health Preparedness*, April 27, 2007.

¹⁰ "Key Players in Foodborne Outbreak Response," accessed May 23, 2015, <http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/key-players.html>.

¹¹ World Health Organization, *Terrorist Threats to Food: Guidance for Establishing and Strengthening Prevention and Response Systems*, 9.

response.¹² To be most effective in surveillance and response, public health professionals need to be intimately aware of partner agencies and be well trained in prevention essentials.¹³ The umbrella of food safety incorporates many components including laboratory, agriculture, manufacturing, and others.¹⁴ All are essential to assuring the safety of the food supply; however, this literature review concentrates on foodborne outbreak communications, including the area of food defense issues affecting the local public health workforce since 9/11.

B. CONCERNS WITH FOOD SAFETY AND FOOD DEFENSE

When it comes to the food supply, a number of terms appear repeatedly in the literature: “food safety” “food defense,”¹⁵ and “food protection.” As detailed by the Institute of Medicine, “food defense” is the science and practice of protecting the food supply from malicious or intentional contamination.¹⁶ Ostfield offers the explanation that food defense includes conducting vulnerability assessments in points along the food chain, such as production, transportation, and service, and finding ways to assure and enhance infrastructure protection, to decrease the ease of a planned attack.¹⁷ This explanation is separate from the concept of food safety, which is protection from

¹² Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 71.

¹³ *Ibid.*, 74.

¹⁴ *Ibid.*, 62.

¹⁵ The notion of “food defense” was begun in the aftermath of 9/11 and was initiated by U.S. government agencies. The initial term adopted for this purpose was “food security.” This term was confusing to many because it was already in wide usage; in other words, the availability of food and someone’s access to it. The FDA still has food defense guidance documents available in print and online that refer to the previously used term “food security.” “Food Defense,” last updated December 22, 2015, <http://www.fda.gov/food/fooddefense/default.htm>.

¹⁶ Institute of Medicine, *Review of Food and Drug Administration’s Role in Ensuring Safe Food* (Washington DC: National Academies Press, 2010), 404.

¹⁷ Marc L. Ostfield, “Diplomacy to Advance Food Defense,” remarks to 6th Global Food Safety and Quality Conference, Chicago, IL, August 1, 2007, 1.

accidents or naturally occurring contamination.¹⁸ Whereas, Linton offers that “food protection” can be considered the amalgamation of both food defense and food safety.¹⁹

Stakeholder confusion over the terminology has impeded the implementation of protective measures for the food supply. As Park points out, those involved in the food and agriculture sector viewed food safety and food defense as different, independent disciplines.²⁰ He further explains that industry and regulators were compelled to separate the management of food safety activities from efforts to combat malicious contamination.²¹ Even the 2009 version of the FDA *Food Code*, the U.S. baseline for food safety, does not include regulatory specifications for food defense; rather, it provides links to guidance documents.²² Food defense may be a new concept, rationalizes Yoe et al., but it is still an integral element of food safety.²³ Sobering concurs by clarifying, “food defense (in the context of food terrorism) must consider both the intentional use of exotic agents (such as anthrax or botulinum toxin) along with the intentional application of traditional foodborne pathogens (such as *Salmonella* and *E. coli* O157:H7). In the latter scenario, it could be difficult, if not impossible, to distinguish the contamination event as being of an intentional nature.”²⁴

In the time after the events of 9/11, it has been widely recognized that the U.S. food supply is susceptible to attack. In writing about this issue, Kumar acknowledged that the U.S. food and agriculture sector has many stops and potential for contamination along the way as food progresses from its point of origin, to the point of consumption by

¹⁸ Ostfield, “Diplomacy to Advance Food Defense,” 1.

¹⁹ Richard H. Linton, *A Guide to Useful Information about Food Protection and Defense* (West Lafayette, IN: Purdue Agriculture Food Science, 2010), 1.

²⁰ David K. Park, “New Thinking On Food Protection: Unlocking Ways to Achieve Food Safety and Food Defense Goals,” *Food Safety Magazine*, December 2006/January 2007, 34.

²¹ Ibid.

²² U.S. Department of Health and Human Services, *Supplement to the 2009 FDA Food Code* (Washington, DC: Food and Drug Administration, 2009).

²³ Charles Yoe et al., “Risk Management: The Value of the Food Defense Plan,” *Food Safety Magazine*, April/May 2008, 16.

²⁴ Lisa A. Sobering, *Food Defense Preparedness in Small and Very Small Meat and Poultry Establishments* (Manhattan, KS: Kansas State University, 2008), <http://krex.k-state.edu/dspace/bitstream/2097/1137/1/L%20Sobering%20Field%20Experience.pdf>.

consumers. Any of these points along the food continuum can be attractive to terrorist attack if not sufficiently protected.²⁵ Kumar was not alone in this consideration. In May 2002, the World Health Organization (WHO) also expressed concern about the potential for terrorists to use food as a platform to spread deadly biological agents, and adopted resolution WHA 55.16 stating so.²⁶

The WHO goes on to note that episodes of intentional contamination are not new or novel,²⁷ and have occurred over history to cause death, as well as economic loss.²⁸ Examples noted in literature include the deliberate contamination of Israeli citrus in 1978,²⁹ of candy in Japan in 1984,³⁰ poisoned fast food in China in 2001 and 2002,³¹ and the deliberate contamination of ground beef in a supermarket in Michigan in 2003.³² Sobering,³³ Dembek, Kortepeter, and Pavlin,³⁴ and Day³⁵ all discuss a 1996 incident in Texas where a disgruntled hospital worker made 12 victims sick by deliberately contaminating baked goods with *Shigella dysenteriae*. Smith reported one example of intentional contamination videotaped and posted on YouTube in April 2009, where

²⁵ Amit Kumar, "An Examination of Policy and Organizational Issues Relating to the Role of Public-Private Partnerships in Preparing for a Terrorist Attack on the Food and Agriculture Sector," *Center for Infrastructure Protection and Homeland Security* 9, no. 5 (November 2010): 4.

²⁶ World Health Organization, *Terrorist Threats to Food: Guidance for Establishing and Strengthening Prevention and Response Systems*, 9.

²⁷ *Ibid.*, 5.

²⁸ *Ibid.*

²⁹ Ehud Sprinzak and Ely Karmon, "Why So Little? The Palestinian Terrorist Organizations and Unconventional Terrorism," *International Institute for Counter-terrorism*, June 17, 2007, <http://www.ict.org.il/Articles/tabid/66/Articlsid/246/currentpage/5/Default.aspx>.

³⁰ *Ibid.*

³¹ Ostfield, "Diplomacy to Advance Food Defense," 2.

³² U.S. Centers for Disease Control and Prevention, "Nicotine Poisoning After Ingestion of Contaminated Ground Beef—Michigan, 2003," *Morbidity and Mortality Weekly Report* 52, no. 18 (May 9, 2003): 413–416.

³³ Sobering, *Food Defense Preparedness in Small and Very Small Meat and Poultry Establishments*, 33.

³⁴ Z. F. Dembek, M. G. Kortepeter, and J. A. Pavlin, "Discernment between Deliberate and Natural Infectious Disease Outbreaks," *Epidemiol. Infect.* 135, no. 3 (April 2007): 353–371.

³⁵ Bryan Day, "Is Food Bioterrorism the Next 9/11?" *The CIP Report* 3, no. 6 (January 2005): 8, http://cip.gmu.edu/archive/CIPHS_TheCIPReport_January2005_FoodAndAgricultureSector.pdf.

employees of one Domino's restaurant were deliberately adulterating food items.³⁶ One of the largest and most disconcerting instances of intentional contamination in the United States, as researched by Elad, was for political reasons, the Rajneeshee cult's poisoning of salad bars in 1984 in which 751 people were affected.³⁷ This act of bioterrorism was not recognized as such for over a year.

These examples are only a few of deliberate attacks; although, Ostfield believes that other attacks with more limited impact may have gone undetected.³⁸

Federal emphasis on safeguarding the food supply has been renewed, but the system is disjointed.

In the wake of 9/11, the Public Health Security and Bioterrorism Preparedness and Response Act ("Bioterrorism Act"), was passed by Congress to increase the FDA's ability to prevent intentionally contaminated food from reaching consumers. It began a new wave of food protection oversight, and mainstreamed the concept of "food defense" into the vocabulary of those employed in any aspect of the food industry.

Since the enactment of the Bioterrorism Act, the U.S. government has continued to address the challenges posed in protecting this nation's food, and has created a number of policy interventions, such as Homeland Security Presidential Directives 7 (2003)³⁹ and 9 (2004),⁴⁰ the FDA Food Protection Plan (2007),⁴¹ and the Food Safety Modernization Act (2010)⁴² to move this country towards safer consumables. The literature continues to refer to these documents and efforts when benchmarking progress (or not) towards an

³⁶ Marijke Schwarz Smith, "Assessing the Risk of Intentional Contamination," *Food Safety News*, December 28, 2010.

³⁷ D. Elad, "Risk Assessment of Malicious Biocontamination of Food," *Journal of Food Protection* 68, no. 6 (June 2005): 1302–5.

³⁸ Ostfield, "Diplomacy to Advance Food Defense," 2.

³⁹ "Homeland Security Presidential Directive 7/HSPD-7," December 17, 2003, www.whitehouse.gov/news/releases/2003/12/20031217-5.html.

⁴⁰ U.S. Department of Health and Human Services, *Food Protection Plan: An Integrated Strategy for Protecting the Nation's Food Supply* (Washington, DC: Food and Drug Administration, 2007).

⁴¹ "Homeland Security Presidential Directive 9/HSPD-9," February 3, 2004, www.whitehouse.gov/news/releases/2004/20040203-2.html.

⁴² *Food Safety Modernization Act*, Pub L. No. 111-353 (January 4, 2011).

effective food protection continuum. The number and extent of the resources, some specific, some oblique, provides for a confusing picture of food defense responsibilities. An easily accessible listing of all the agencies, directives and policies encompassing protection of food is not available. A 2011 report released by the U.S. Government Accountability Office (GAO) identified a minimum of 15 agencies with watchful administration over various food safety laws.⁴³ Additional reviews by the University of Maryland,⁴⁴ David et al.,⁴⁵ and Taylor and David concur,⁴⁶ suggesting that the U.S. food supply is governed by at least 30 laws, with 12 or more federal agencies keeping it all in check. The GAO goes on to assert, “the disconnect between agencies is so wide that multiple agencies have separate enforcement capabilities on different aspects of the same food type, which results in government red tape and ample opportunities for obvious sources of food-borne illnesses to fall through the cracks.”⁴⁷

Response coordination in large-scale emergencies, including terrorist attacks on the food supply, is overseen by the U.S. Department of Homeland Security (DHS), in collaboration with federal, state, and local officials and private sector parties.⁴⁸

In 2004, Homeland Security Presidential Directive 9 (HSPD-9) was issued, ordering a national policy to defend the U.S. food supply against natural or manmade threats.⁴⁹ As part of its protective charge, the DHS leads HSPD-9’s efforts to, “ensure that the combined federal, state, and local response capabilities are adequate to respond

⁴³ U.S. Government Accountability Office, *Food Safety Working Group Is a Positive First Step but Governmentwide Planning Is Needed to Address Fragmentation* (GAO-11-289) (Washington, DC: U.S. Government Accountability Office, 2011), 1.

⁴⁴ “Listeria Outbreak Exposes Red Tape in U.S. Food Safety System,” October 5, 2011, <http://www.mdchhs.com/blog/listeria-outbreak-exposes-red-tape-us-food-safety-system>.

⁴⁵ Stephanie David et al., “The Essential Role of State and Local Agencies in Food Safety and Food Safety Reform,” *The Food Safety Research Consortium*, 2009, 3.

⁴⁶ Michael R. Taylor and Stephanie David, *Stronger Partnerships for Safer Food: An Agenda for Strengthening State and Local Roles in the Nation’s Food Safety System* (Washington, DC: George Washington University, 2009), 6.

⁴⁷ U.S. Government Accountability Office, *Food Safety Working Group Is a Positive First Step but Governmentwide Planning Is Needed to Address Fragmentation*, 1.

⁴⁸ “Ensuring Resilience to Disasters,” accessed December 18, 2015, <https://www.dhs.gov/ensuring-resilience-disasters>.

⁴⁹ Office of the Inspector General, *DHS’ Role in Food Defense and Critical Infrastructure Protection* (OIG-733) (Washington, DC: Department of Homeland Security, 2007), 18.

quickly and effectively to a terrorist attack, major disease outbreak, or other disaster affecting the national agriculture or food infrastructure.”⁵⁰ Information sharing and communications are vital to such federal, state, and local response activities, but assuring seamless and timely message transfer between an assortment of government agencies remains a point of difficulty. In September 2011, the GAO⁵¹ and the Office of the Inspector General⁵² released a report saying there is still no centralized coordination of the federal government’s food and agriculture defense policy, or adequate addressing of the food related sections of the National Infrastructure Protection Plan.⁵³ Similarly, in 2011, the FDA conceded that the identification of a standard protocol and platform for disseminating and sharing information with the food and agriculture critical infrastructure sector remains a significant challenge.⁵⁴ Further, as protocols and systems for communication and response are considered, as the FDA notes, system improvements should be created with ongoing participation from regulatory partners at all levels.⁵⁵ In addition, funding and resources continue to be documented as deficiencies. For example, the Federal Emergency Management Agency (FEMA) reports that from 2003 to 2007, the food and agriculture sectors received only about 1% of state homeland security grant funding.⁵⁶ Improvements to the system are not progressing easily, as in 2009, the President’s Food Safety Working Group called the nation’s food safety system “anything

⁵⁰ “Ensuring Resilience to Disasters.”

⁵¹ U.S. Government Accountability Office, *Federal Oversight of Food Safety FDA’s Food Protection Plan Proposes Positive First Steps, but Capacity to Carry Them Out Is Critical*, 2.

⁵² U.S. Government Accountability Office, *Challenges for the Food and Agriculture Sector in Responding to Potential Terrorist Attacks and Natural Disasters* (GAO-11-946T) (Washington, DC: U.S. Government Accountability Office, 2011), 3.

⁵³ Ibid.

⁵⁴ U.S. Department of Homeland Security, U.S. Food and Drug Administration, and U.S. Department of Agriculture, *2011 Sector Critical Infrastructure Protection Annual Report for the Food and Agriculture Sector* (Washington, DC: U.S. Department of Homeland Security, U.S. Food and Drug Administration, and U.S. Department of Agriculture, 2011).

⁵⁵ Ibid.

⁵⁶ *United States Senate Committee on Homeland Security and Governmental Affairs, Subcommittee on Oversight of Government Management, the Federal Workforce, and the District of Columbia, Agro-defense: Responding to threats Against America’s Agriculture and Food System*, 112th Cong., 1 (2011).

but flexible and coordinated.”⁵⁷ Although the literature can illustrate intent for improvement, this documentation of continued gaps persists.

Nearly all the literature reviewed refers to federal documents and policies on food protection. These increasing federal governmental responsibilities regarding food protection oversight are extensive, and not without repercussions. In its 2010 publication, *Ensuring Safe Food*, the Institute of Medicine reported the FDA’s food safety responsibilities created a perfect foundation for food defense coordination; however, food defense can suffer when the agency becomes involved with day-to-day outbreak and recall activities.⁵⁸ Indeed, when food safety funding was diminishing to the extent that federal food safety experts were being lost, the agency compensated by requiring more of the state and local regulators.⁵⁹

Throughout the literature about this nation’s food safety and food defense system, frequent reference is made to the necessity of collaborative efforts from federal, state, local, and territorial (FSLT) levels. David et al. elucidate that while policy begins on the federal level, the federal food safety programs represent only a fraction of the state and local health agencies also involved in food safety oversight. While David et al. emphasize that although many federal agencies are involved in protecting the food supply, the local regulatory agency shoulders the burden for day-to-day surveillance, oversight, and response.⁶⁰

David et al. detail that over 3,000 local health departments are working to assure the safety of the food supply in the United States, and that number does not include health and agriculture agencies at the state level or public health laboratories. The National Association of County and City Health Officials (NACCHO) concurs such that food defense has become another major responsibility and challenge to a burdened local

⁵⁷ Tom Karst, “Food Safety Working Group—Key Findings,” *The Packer*, July 8, 2009, http://www.thepacker.com/opinion/fresh-talk-blog/food_safety_working_group_-_key_findings_122016289.html.

⁵⁸ Institute of Medicine and National Research Council, *Ensuring Safe Food: From Production to Consumption*, 75.

⁵⁹ *Ibid.*, 44.

⁶⁰ David et al., “The Essential Role of State and Local Agencies in Food Safety and Food Safety Reform.”

system. The NACCHO goes on to blueprint since 2008, staffing reductions at health departments on the local level account for 34,400 fewer public health workers across the United States. These losses mean fewer trained professionals at the community level ready to protect public health and respond to health threats, foodborne outbreaks, and other local emergencies. Further, the NACCHO reports in 2011, the capacity to provide services or respond to public health emergencies has been reduced in 40 percent of local health departments, likely as a result of reduced funding.⁶¹ DeWaal establishes that despite this nation's awareness of naturally occurring agents of foodborne illness, pathogens, such as Salmonella, Shigella and *E. coli* O157:H7, still cause major outbreaks in the United States.⁶² Whittenberger and Dohlman document that foodborne illnesses affect a wide range of food products, which contributes to the difficulty of attributing illnesses to a singular food source.⁶³ Whereas literature by Powell and Chapman, Hargrove, Kim and Hooker repeatedly illustrate incidents where the U.S. food protection system fails in executing a rapid, coordinated response to reduce disease, and in communicating situational awareness to stakeholders in a timely fashion.⁶⁴

Recent food safety breakdowns have been covered extensively by researchers and the media, and lays out a sobering picture of system inadequacies for food protection. Repeated references are made by Ostfield, Falkenstein, and Maki to the 2006 *E. coli* O157:H7 outbreak from contaminated spinach, which affected 26 states, caused three deaths, and resulted in more than 200 ill,⁶⁵ the Salmonella Saintpaul outbreak in 2008 that caused over 1,400 illnesses and an estimated monetary loss of \$100 million damage

⁶¹ National Association of County and City Health Officials, *NACCHO Issue Brief: FY 2012 Centers for Disease Control and Prevention Public Health Prevention and Workforce Funding* (Washington, DC: National Association of County and City Health Officials, 2011), 1–2.

⁶² Caroline Smith Dewaal, *2009 Outbreak Alert* (Washington, DC: Center for Science in the Public Interest, 2009), 5–6.

⁶³ Kelsey Wittenberger and Erik Dohlman, *Impacts of the 2009–09 Foodborne Illness Outbreak Linked to Salmonella in Peanuts* (Washington, DC: USDA, Economic Research Service, 2010).

⁶⁴ Doug Powell and Benjamin Chapman, “Two Norovirus Outbreaks: Same Food Safety Failure,” *Food Safety Network Infosheet*, November 30, 2006; Thomas Hargrove, “Many States Fail to Identify Food-borne Illnesses,” *Scripps Howard News Service*, December 21, 2006; Meebok Kim and Neal Hooker, “A Regional-level Comparison of the Cost of Food Safety Failures,” The Ohio State University, 2006, https://kb.osu.edu/dspace/bitstream/handle/1811/6156/OARDC_kmb.nhh.pdf?sequence=1.

⁶⁵ Ostfield, “Diplomacy to Advance Food Defense,” 52.

to the tomato industry,⁶⁶ and the *Salmonella* Typhimurium outbreak in peanut butter and peanut products in 2008–2009, where 22,500 became ill.⁶⁷ In addition, at the time of this literature review, the Centers for Disease Control and Prevention CDC reports investigating 133 persons in 26 states exhibiting symptoms of outbreak-associated strains of *Listeria monocytogenes*, plus 28 related deaths and one miscarriage. This illness toll is now considered the third worst in U.S. history.⁶⁸

As sobering as these reports are, it is even more eye-opening when the FDA Food Protection Plan (2007) concedes that not all outbreaks or illnesses are noticed or documented. The repeated logic is that if unintentional illnesses related to the food encounter difficulties in being identified and addressed, how can the U.S. food safety system stop a determined individual or individuals from exploiting this vulnerability?⁶⁹ As Tommy Thompson pondered, why have terrorists not attacked this nation's food supply? In terms of food defense, what is not known may be this country's Achilles' heel in adequately protecting the U.S. food supply. The major unknowns through this literature review illustrate how far it is necessary to progress in this area.

Although subject matter experts have a concept of the type of agents likely to be utilized in an attack on the food supply, the biggest unknowns are likely to remain so until after an incident:

⁶⁶ Drew Falkenstein, "2006 Spinach E. coli Outbreak Revisited," *Food Poison Journal*, September 13, 2009, www.foodpoisonjournal.com/food-poisoning-information/2006-spinach-coli-outbreak-revisited; Dennis G. Maki, "Don't Eat the Spinach—Controlling Foodborne Infectious Disease," *New England Journal of Medicine* 355 (2006): 1952–1955.

⁶⁷ Centers for Disease Control and Prevention, "Outbreak of *Salmonella* Serotype Saintpaul Infections Associated with Multiple Raw Produce items—United States, 2008," *Morbidity and Mortality Weekly Report* (MMWR), August 29, 2008; The response to the *Salmonella* Typhimurium outbreak marked the first time that the CDC utilized social media as a means of communication; Centers for Disease Control and Prevention, *2008–2009 Salmonella Typhimurium Outbreak Response November 2008–March 2009 After Action Report* (Atlanta, GA: Centers for Disease Control and Prevention, 2009).

⁶⁸ Centers for Disease Control and Prevention, *Multistate Outbreak of Listeriosis Linked to Whole Cantaloupes from Jensen Farms, Colorado* (Atlanta, GA: Centers for Disease Control and Prevention, 2011).

⁶⁹ U.S. Department of Health and Human Services, Food and Drug Administration, *Food Protection Plan: An Integrated Strategy for Protecting the Nation's Food Supply*.

- When is an attack on this nation's food supply going to occur?
- What will be the contaminant, and where and how will it be distributed?
- How long will it take for the U.S. system to identify the situation?
- How many people will be affected by disease or death?⁷⁰

Despite these unknowns, the WHO believes there is “a real and widespread threat to public health from the intentional and malicious contamination of food above naturally occurring threats.”⁷¹ What is the best way to balance protection of the public with available resources? It is an ongoing conundrum.

From a homeland security perspective, additional areas of knowledge, policy, and initiative exploration can help assure a more robust food defense system. Food defense should be seamlessly integrated into food safety. The public health system and its stakeholders need to collaborate, conceptualize, and develop a new and enhanced aptitude for addressing the threat of food terrorism and integrate it into a compatible food defense and food safety framework. As long as food defense is kept separate from food safety, resources will continue to be divided, and priorities will keep shifting. Unless and until a coordinated systems approach is created to include food defense, preventive efforts will continue to have areas of impotency.

C. FOODBORNE OUTBREAK REPORTING TRENDS

Whether an outbreak originates from malicious intent, or is accidental or naturally occurring, the avenues for communications among government stakeholders remain the same.

Foodborne illness is common. National estimates from the CDC declare one in six persons (48 million people) annually become ill from something they ate,⁷² and widespread outbreaks related to food have increased three-fold over the last 20 years. In

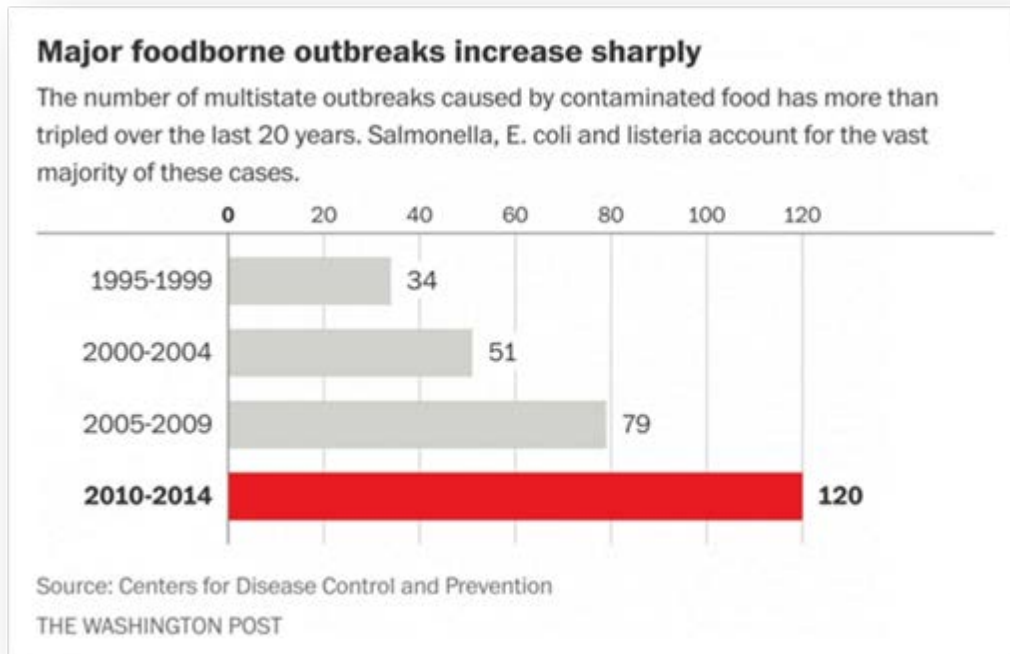
⁷⁰ “Bioterrorist Attack on Food: A Tabletop Exercise,” March 2004, <http://www.nwcphp.org/training/opportunities/drills-exercises/bioterrorist-attack-on-food>.

⁷¹ World Health Organization, *Terrorist Threats to Food: Guidance for Establishing and Strengthening Prevention and Response Systems*, 9.

⁷² “Foodborne Germs and Illnesses,” assessed December 22, 2015, <http://www.cdc.gov/food/safety/foodborne-germs.html>.

addition, data analysis from foodborne outbreaks in the years between 2010 and 2014 points to a disturbing uptick in mortality due to foodborne outbreaks. See Figure 1.

Figure 1. Foodborne Illness on the Rise



Source: Lena H. Sun, “Big and Deadly: Major Foodborne Outbreaks Spike Sharply,” *Washington Post*, November 3, 2015, <https://www.washingtonpost.com/news/to-your-health/wp/2015/11/03/major-foodborne-outbreaks-in-u-s-have-tripled-in-last-20-years/>.

These statistics illustrate the magnitude of the problem in the United States. However, many foodborne illness cases are not categorized under the umbrella of “outbreak” due to reasons, such as under-reporting or insufficient epidemiologic evidence. As former FDA Senior Advisor, Jack Guzewich, articulated in *Food Safety News*, foodborne illness victims “self-identify and report most foodborne disease outbreaks to state or local agencies. These outbreaks are often linked to local restaurants, investigated locally and often not reported in the media. Such outbreaks are not always reported to the Centers for Disease Control and Prevention’s foodborne illness

surveillance system, as reporting is voluntary.”⁷³ The International Association of Food Protection (IAFP) also describes some of the difficulties. Foodborne outbreaks can be identified by the number of persons presenting with similar illness symptoms in a short period of time. The challenge is that often only a few persons become ill and even fewer may report it to health authorities. Discerning if reported illnesses are related or coincidental is a challenge. In addition, some highly contagious diseases may be passed on to others, or to food and water, which adds to confusion in investigations.⁷⁴

To understand best how food-related illness impacts the public health system in the United States, and how health professionals work to plan, prepare, investigate, and respond to intentional and unintentional contamination of food, it is necessary to briefly review how an outbreak typically unfolds.

D. ANATOMY OF A FOODBORNE ILLNESS OUTBREAK

A foodborne disease outbreak is defined, in simple terms, as “an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food.”⁷⁵

For an outbreak to be identified, it is necessary for public health officials to observe or document unusual rates of illness in a population. An example, set forth by the Council to Improve Foodborne Outbreak Response (CIFOR), might be if a jurisdiction identifies more ill persons than is typically expected in the community. When illness rates increase, public health needs to determine the cause.

A health department may also suspect a possible foodborne outbreak when it receives phone calls from sick individuals experiencing gastrointestinal symptoms, such as vomiting or diarrhea. A public health professional, typically a nurse or sanitarian, will

⁷³ John J. Guzewich, “No Quick Fixes for Outbreak Surveillance and Response,” *Food Safety News*, March 22, 2012, <http://www.foodsafetynews.com/2012/03/challenges-to-foodborne-disease-outbreak-surveillance-response/#.VqKbA5orKM8>.

⁷⁴ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 6th ed. (New York: Springer, 2011), 20.

⁷⁵ “Guide to Confirming an Etiology in Foodborne Disease Outbreak,” accessed November 18, 2015, http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/confirming_diagnosis.html.

review relevant personal activities with the victims, such as what they did, where they went, what they ate, if they are aware if others are ill, and if they visited a healthcare provider in the previous days and weeks. This review is conducted to identify a connection to a possible food source.

Healthcare providers are important to outbreak identification as they decide whether specimens from their patient(s) will be forwarded to a clinical laboratory for analysis. Findings from the laboratory can provide the verification or essential clues to a likely cause of infection.

If illness is suspected to have originated from a food facility, the health department will send a member of the inspection staff to the site to conduct an environmental assessment to review related hygiene protocols and discern the environment and processes that suspect foods may have experienced.

Environmental and food samples may be taken for testing. Food can become contaminated from a wide variety of circumstances, such as the improper handling or temperature control, poor hygiene or ill workers, accidental situations, naturally occurring microorganisms, malicious tampering, or intentional adulteration. Thus, a thorough assessment and sampling protocols are essential to diagnose the situation. With this information, a health department can recommend control actions if strong evidence presents that the food facility contributed to illness.

As information on the possible disease source is uncovered, epidemiologists will create a hypothesis and accompanying case definition, regarding where the outbreak occurred,⁷⁶ and defining if an individual is affected by the outbreak under investigation.

The coordinating agency in an outbreak may be federal, state, or local, depending on the geographic spread of disease. Just as deoxyribonucleic acid (DNA) can be important evidence in criminal investigations, working with laboratories to identify the fingerprint of disease causing bacteria, viruses, or parasites can help finger the culprits in an illness investigation. An outbreak limited to a small geographic area might be handled

⁷⁶ “Anatomy of a Food-Borne Illness Outbreak,” accessed November 17, 2015, <http://www.phac-aspc.gc.ca/fs-sa/anato-eng.php>.

by local health officials, while an outbreak with cases in multiple jurisdictions will likely be led by state officials. The CDC takes a lead role when outbreaks stretch across multiple states.⁷⁷ If the implicated food source is a commodity regulated by the FDA or the U.S. Department of Agriculture, Food Safety and Inspection Service (USDA-FSIS), these agencies need to be contacted to assure the recall and removal of the suspect foodstuffs from sale or use.⁷⁸

Throughout the course of an investigation, additional public health agencies—state, local, and federal—may be advised or asked to assist in surveillance and response, based on the severity, geography, and people affected and/or if the originating health agency has insufficient resources. Such correspondence can be face-to-face, through phone calls, emails, electronic databases, or other means. Additionally, public health officials have a role in providing information and education to the public so that residents can be aware if they are at risk and be advised of any protective measures they can take.

The Public Health Agency of Canada described the outbreak investigation process well:

Solving an outbreak is like having to piece together a picture puzzle, except in most cases officials do not start with all the pieces, and do not know what the picture looks like, how many pieces it has, or where those pieces are. Outbreak investigations are non-linear, and often many of these steps occur concurrently. It may take a number of weeks from the time an individual becomes ill to the time a food source is identified and action is taken. In some cases, the source of the outbreak is never found.⁷⁹

If affected individuals do not report the incident to the health department, the outbreak may go undetected. If a health department does not voluntarily provide notification of the outbreak to the CDC for inclusion in morbidity assessments and the development of national disease statistics, it is not added to its national recordkeeping of disease trends. Lastly, once the outbreak is over, involved agencies conduct after-action

⁷⁷ “CDC’s Role in Outbreak Investigations,” accessed August 24, 2015, <http://www.cdc.gov/food/safety/outbreaks/multistate-outbreaks/cdc-role.html>.

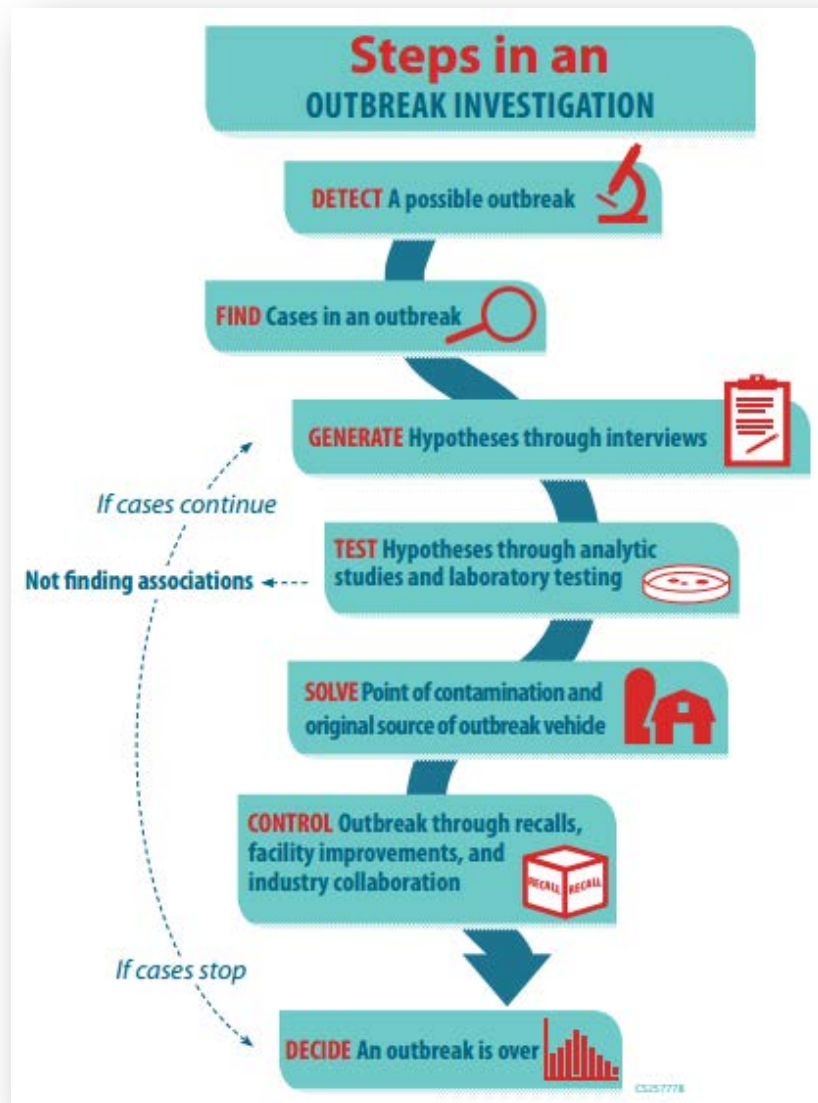
⁷⁸ “Pulsed-field Gel Electrophoresis (PFGE),” accessed November 29, 2014, <http://www.cdc.gov/pulsenet/pathogens/pfge.html>.

⁷⁹ “Anatomy of a Food-Borne Illness Outbreak.”

reviews for best practices and lessons learned, to identify gaps and boost system effectiveness.

A flow diagram depicting the steps in an outbreak investigation can be viewed in Figure 2.

Figure 2. Outbreak Investigation Diagram



Source: Centers for Disease Control and Prevention, *Steps in an Outbreak Investigation*, last reviewed March 24, 2015, <http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/investigations/>.

Local-level foodborne outbreak reporting is essential to identify who in the public is affected, what agent is causing the illness, and assure care and follow up. Public health workers are responsible to conduct this follow up, which includes assuring sick individuals seek treatment and identifying contacts who may also be affected. Treatment may include interventions, such as vaccination, quarantine, or health education. In addition, public health professionals are responsible for environmental assessments to identify and mitigate health hazards, and may close premises implicated in the outbreak, if necessary, to disrupt the spread of disease.⁸⁰ As the CDC advocates, surveillance of notifiable conditions assists public health in disease tracking and determining which interventions are most effective in abetting the spread of disease, and may also lay the foundation for policy development related to outbreak identification and response.⁸¹

E. RECENT HISTORY OF FOODBORNE OUTBREAKS

Over time, the United States has experienced a plenitude of deadly outbreaks attributed to food. Some of the most lethal foodborne epidemics were recorded in the early 1900s; streptococcus in unpasteurized milk in 1911 and 1922 resulted in more than 2,400 illnesses and 70 deaths.⁸² A botulism outbreak in 1919, attributed to canned olives, resulted in canning process changes to protect public health.⁸³ Oysters were the source of *Typhi* bacteria during an outbreak spanning the years of 1924–1925, which sickened 1,500, and killed 10% of the victims.⁸⁴

⁸⁰ Ray M. Merrill, *Principles of Epidemiology Workbook: Exercises and Activities* (Provo: UT: Brigham Young University, 2011).

⁸¹ U.S. Centers for Disease Control and Prevention, “Summary of Notifiable Diseases—United States, 2012,” *Morbidity and Mortality Weekly Report* 61, no. 53 (2014): 2, <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6153a1.htm>.

⁸² The Merman Law Firm, “History of Food Poisoning in the United States,” accessed October 8, 2015, <http://thefoodpoisoninglawyers.com/history-of-food-poisoning-in-the-united-states/>.

⁸³ *Ibid.*

⁸⁴ *Ibid.*

Incidence and severity of foodborne infection seem to have increased over the past two decades, as additional outbreaks added to the morbidity and mortality toll attributed to food consumption. Although many causes of foodborne illness are diagnosed through ever-growing scientific knowledge and public health surveillance, - efforts to identify and address foodborne outbreaks continues to be a public health challenge, as illustrated by this sample of widespread outbreaks from the past decade:

- The 2006 *E. coli* contamination in fresh spinach, which caused over 200 infections spread throughout 26 states and resulted in 102 hospitalizations and five deaths.⁸⁵
- A 43-state outbreak (plus District of Columbia and Canada) attributed to *Salmonella* Saintpaul affected 1,442 people between April and August 2008.⁸⁶ The CDC determined Serrano and Jalapeño peppers were the culprits, but also believe tomatoes may have also been a source of the bacteria.
- *Salmonella* Typhimurium in peanut butter and peanut paste from the Peanut Corporation of America in 2008–2009 caused disease in at least 174 people, killed nine, and reached across 46 states.⁸⁷
- *Listeria* in Jensen Farms cantaloupe in 2011 infected at least 146 people, killed 30 and resulted in more than 1.5 million cantaloupes being recalled in 24 states.⁸⁸
- From September 2015 to the time of this report, *Salmonella* Poona from imported Mexican cucumbers made 888 persons ill, and was responsible for 191 hospitalizations and six deaths. Investigation and response for this outbreak is ongoing.⁸⁹

⁸⁵ “Reports of Selected *E. coli* Outbreak Investigations,” accessed October 8, 2015, <http://www.cdc.gov/ecoli/outbreaks.html>.

⁸⁶ “Reports of Selected *Salmonella* Outbreak Investigations,” accessed October 8, 2015, <http://www.cdc.gov/salmonella/outbreaks.html>.

⁸⁷ Associated Press, “Ex-peanut Company Exec Gets 28 Years in *Salmonella* Outbreak That Killed 9,” *LA Times*, September 21, 2015, <http://www.latimes.com/nation/nationnow/la-na-nn-salmonella-sentence-20150921-story.html>. In September 2015, the owner of PCA was sentenced to 28 years in prison, the stiffest punishment ever handed out to a producer in a foodborne outbreak case.

⁸⁸ “*Listeria* Outbreaks,” accessed October 8, 2015, <http://www.cdc.gov/listeria/outbreaks/index.html>.

⁸⁹ “Multistate Outbreak of *Salmonella* Poona Infections Linked to Imported Cucumbers,” accessed January 2, 2016, <http://www.cdc.gov/salmonella/poona-09-15/>.

The FDA suggests that illness due to the consumption of food appears to be on the rise, potentially a consequence of increased surveillance and enhanced public health procedures for disease recognition. In 2009, the agency reported that federal, state, and local public health agencies are identifying more multistate outbreaks and are linking sporadic cases caused by the same disease agent in different states or regions. Further, they assert despite public health's enhanced ability to diagnose the existence of foodborne outbreaks, the challenge of emerging and reemerging diseases across the globe can quickly overwhelm oversight agencies. Modern ways of processing and transporting foods can lead to larger-scale outbreaks due to the economics of scale. This geographic spread can lead to outbreaks spanning over longer periods of time, which adds to the difficulties of identification and response.⁹⁰

Despite challenges, it is important to note historically speaking, many instances have occurred, including some the aforementioned cases, in which different levels of government have cooperated or collaborated to identify and stem the spread of disease. Despite the collaborative response efforts of federal, state, and local public health agencies, these complexities of the U.S. food system can amplify the impact of outbreaks. Recognizing the potential negative consequences of outbreak response gaps, in 2008, the PEW trust conducted post-mortems of recent outbreaks, and identified three areas of concern: policy, communications with the media and consumers, and the public health system's organization and outbreak response.⁹¹

Numerous naturally occurring, or “unintentional,” foodborne outbreaks over the past few years showcase how susceptible the food supply can be. Outbreaks spanning multiple states are rising exponentially, increasing from an average of 2.5 per year from 1973–1980 to 13.5 per year from 2001–2010.⁹² Similarly, the United States experienced an upsurge in the number of persons who became ill, were hospitalized, or died from

⁹⁰ “What You Should Know about Government Response to Foodborne Illness Outbreaks,” accessed August 18, 2015, <http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm180323.htm>.

⁹¹ The Pew Charitable Trusts, *Breakdown: Lessons to Be Learned from the 2008 Salmonella Saintpaul Outbreak* (Washington, DC: The Pew Charitable Trusts, 2008).

⁹² V. D. Nguyen et al., “Increase in Multistate Foodborne Disease Outbreaks-United States, 1973–2010,” *Foodborne Pathog Dis.* 12, no. 11 (November 2015): 867–72, doi:10.1089/fpd.2014.1908.

multi-state associated epidemics related to food. The increase in these types of outbreaks highlights the necessity for a coordinated cross-jurisdictional response, as foodborne disease outbreaks that span across states lead to nearly twice the number of hospitalizations and deaths than outbreaks within states.⁹³

In addition to the cost to the health of the public, foodborne outbreaks take a fiscal toll. The economic impact of foodborne illness is staggering, costing the U.S. economy more than \$15.6 billion. This price tag does not include the expense of federal, state, and local response, recall expenses, or economic losses due to decreased consumer confidence.⁹⁴

F. IMPORTANCE OF COMMUNICATION IN ADDRESSING FOODBORNE OUTBREAKS

Foodborne outbreaks, depending on their size and severity, may necessitate the use of crisis and disaster management principles. During the course of an outbreak, people in the community are becoming sick or dying, and it may take a number of professionals and agencies working together to coordinate a response.

Given the day-to-day charge to public health departments of reducing morbidity and mortality, is foodborne outbreak monitoring and response an emergency, or arguably, business as usual? Often it depends on the size, severity, origin, and geography of the outbreak, as well as the resources and competencies of the responding agency. Response, in the context of foodborne illness outbreaks, covers a broad range of activities related to the investigation, response, and control.⁹⁵

⁹³ Renee Cree, "For Safer Food, Communication is Key," *Temple University News Center*, June 9, 2010, <http://news.temple.edu/news/safer-food-communication-key>.

⁹⁴ Dan Flynn, "USDA: U.S. Foodborne Illnesses Cost More than \$15.6 Billion Annually," *Food Safety News*, October 9, 2014, <http://www.foodsafetynews.com/2014/10/foodborne-illnesses-cost-usa-15-6-billion-annually/#.Vqq88JorLIU>.

⁹⁵ "Canada's Food-borne Illness Outbreak REsponse Protocol (FIORP) 2010: To Guide a Multi-Jurisdictional Response," accessed January 9, 2015, <http://www.phac-aspc.gc.ca/zoono/fiorp-mitioa/index-eng.php>.

When faced with everyday job responsibilities, utilizing established and standardized procedures in the workplace is usually viewed as a normal business function. However, the stress of emergencies or unexpected events can put public health agencies in a state of crisis.⁹⁶ As expressed by Guzewich:

When it comes to foodborne disease surveillance, detection, investigation and response, there often is a lack of clarity over roles and responsibilities and decision-making authority, especially since staff qualifications and training levels in public health professionals vary and local health agencies may have limited experience participating in multi-agency outbreak response.⁹⁷

Outbreaks are disease disasters, and as described by Quarantelli and Dynes, can “produce conditions of greater uncertainty, greater diversity, decreased formalizations and decreased centralization, unless all responders follow pre-established protocols.”⁹⁸

In addition, the lack of familiarity with crisis management can prompt health agencies to coordinate response by feedback, which is why pre-established, bi-directional communication planning is essential.⁹⁹

The *9/11 Commission Report* recommended that first responder agencies intensely engage in the provision of purposeful training in accordance with Incident Command System (ICS) and unified command procedures.¹⁰⁰ When responding to public health emergencies, such as outbreaks, agencies are obliged to institutionalize and coordinate communications using the National Incident Management System (NIMS), as required under Homeland Security Presidential Directive 5 (HSPD-5).¹⁰¹ According to

⁹⁶ Naim Kapucu, “Interagency Communication Networks During Emergencies, Boundary Spanners in Multiagency Coordination,” *The American Review of Public Administration* 36, no. 2 (June 2006): 209, doi:10.1177/0275074005280605.

⁹⁷ Guzewich, “No Quick Fixes for Outbreak Surveillance and Response.”

⁹⁸ Enrico L. Quarantelli and Russell R. Dynes, “Response to Social Crisis and Disaster,” *Annual Review of Sociology* 3 (1977): 25.

⁹⁹ Kapucu, “Interagency Communication Networks During Emergencies, Boundary Spanners in Multiagency Coordination,” 211.

¹⁰⁰ National Commission on Terrorist Attacks Upon the United States, *The 9/11 Commission Report* (New York: W.W. Norton & Company, 2004), 397.

¹⁰¹ “Federal Emergency Preparedness Directives and Systems,” accessed October 31, 2015, <http://www.astho.org/Programs/Preparedness/Public-Health-Emergency-Law/Emergency-Authority-and-Immunity-Toolkit/Federal-Emergency-Preparedness-Directives-and-Systems-Fact-Sheet/>.

FEMA, “all federal, state, territorial, tribal, private sector, and nongovernmental personnel with a direct role in emergency preparedness, incident management, or response”¹⁰² must complete NIMS training.¹⁰³ As of 2008, the NACCHO reports 85% of local health departments complied with NIMS requirements related to emergency preparedness. Despite this assurance of training, currently, no formal assessment is available of the number of NIMS certified public health professionals in the United States.¹⁰⁴

In addition, to assure a workforce well-versed in coordinated response, NIMS certification should ideally be partnered with additional emergency response training, drills, simulations, and field experience.¹⁰⁵

Part of the practice of inter-and intra-agency communication is not only following a specified reporting structure, but knowing what to say, how to say it, which communication tool(s) to use, and instruction and drills on how to do it effectively. The continual modernization of computers, smartphones, and information technologies has reshaped the ways communication occurs. Government at all levels needs to assure the public health system is not practicing 21st century public health with 20th century communications technology. In addition, public health funders and policymakers need to understand that modern technology, databases, secure portals, smartphones, and other innovations need accompanying training, policies, and protocols for both senders and recipients to be most effective. Enhancements in modern technology present a great opportunity to enhance routine and emergency communication and information exchange

¹⁰² Federal Emergency Management Agency, *NIMS and the Incident Command System* (Washington, DC: Federal Emergency Management Agency, 2004), http://www.fema.gov/txt/nims/nims_ics_position_paper.txt.

¹⁰³ Sivan Kohn et al., “Public Health-Specific National Incident Management System Trainings: Building a System for Preparedness,” *Public Health Rep.* 125 (Suppl 5) (2010): 43–50, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2966644/>.

¹⁰⁴ Kohn et al., “Public Health-Specific National Incident Management System Trainings: Building a System for Preparedness,” 48.

¹⁰⁵ Ibid.

between all levels of public health agencies. If properly funded, used, and maintained, such enhancements can accelerate coordination in foodborne outbreak response operations. Currently, communication between federal, state, and local health agencies is a composite overlay of existing systems, databases, etc. This communication is addressed in further detail later in this chapter.

G. THE RISK FROM INFORMATION DELAYS

Although referring to law enforcement, The Armed Forces Communications and Electronics Association's (AFCEA) perspective can easily be representative of public health. The AFCEA contends that "the goal of sharing information has a long, murky, and complex history. Part of the problem has been an inconsistent implementation of policies stemming from different interpretations of what is legally allowed."¹⁰⁶ Understandably, public health needs to protect the privacy of citizens when sharing information.

Of particular concern in the public health community is assuring the privacy protection afforded individuals by the U.S. Department of Health and Human Services (HHS), pursuant to the Health Insurance Portability and Accountability Act of 1996 (HIPAA). As CDC explains:

The Privacy Rule allows covered entities to disclose protected health information to public health authorities when required by federal, tribal, state, or local laws [45 CFR 164.512(a)]. This includes state laws (or state procedures established under such law) that provide for receiving reporting of disease or injury, child abuse, birth, or death, or conducting public health surveillance, investigation, or intervention.¹⁰⁷

¹⁰⁶ Armed Forces Communications and Electronics Association (AFCEA), *The Need to Share: The U.S. Intelligence Community and Law Enforcement* (Fairfax, VA: Armed Forces Communications and Electronics Association (AFCEA), 2007), 4.

¹⁰⁷ U.S. Centers for Disease Control and Prevention, "HIPPA Privacy Rule and Public Health," *Morbidity and Mortality Weekly Report* 52 (April 11, 2003): 1–12, <http://www.cdc.gov/mmwr/preview/mmwrhtml/m2e411a1.htm>.

The liability of sharing information needs to be weighed against the risk of not “connecting the dots.” As AFCEA asks, “What is the true value of having important information—even if it comes from a tenuous source in some cases—if the information is never shared with others who may need it and who may add value to the information?”¹⁰⁸ In the instance of foodborne outbreaks, delays in communication can lead to unwanted consequences, such as an increase in cases, in morbidity, and in extreme cases, mortality. To this end, the CDC further explains:

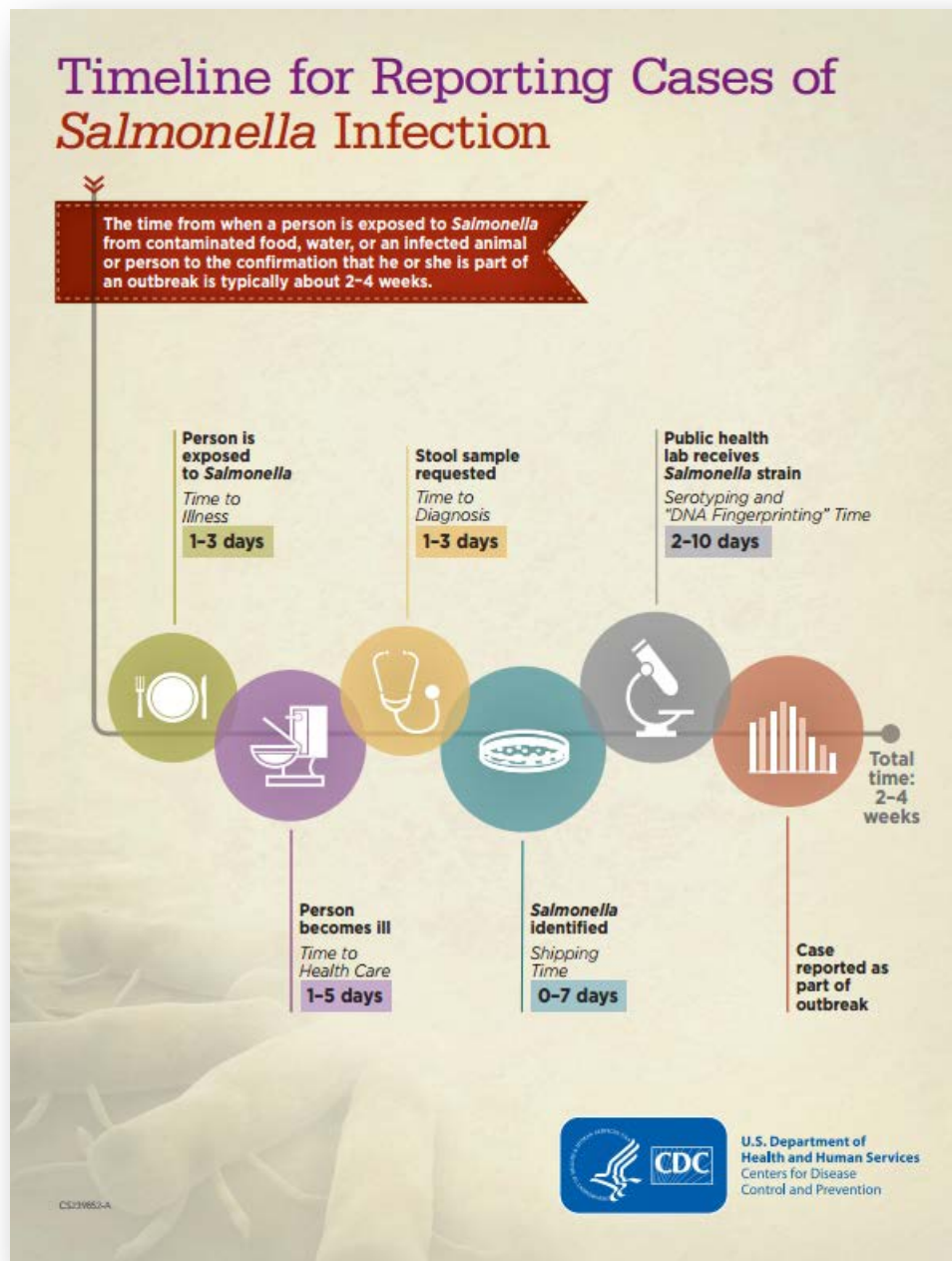
Balancing the protection of individual health information with the need to protect public health, the Privacy Rule expressly permits disclosures without individual authorization to public health authorities authorized by law to collect or receive the information for the purpose of preventing or controlling disease, injury, or disability, including but not limited to public health surveillance, investigation, and intervention.¹⁰⁹

In the CDC’s foodborne illness timeline graphic, it may take 2–4 weeks from the date of exposure for a health department to be notified of a foodborne illness (see Figure 3). Any unnecessary lag in the system can add to this time interval, and hinder public health steps to interrupt further disease transmission. To prevent delays, it is beneficial for health departments to know and understand what outbreak information they can share with their public health partners, in advance of a situation.

¹⁰⁸ Armed Forces Communications and Electronics Association (AFCEA), *The Need to Share: The U.S. Intelligence Community and Law Enforcement*, 4.

¹⁰⁹ U.S. Centers for Disease Control and Prevention, “HIPPA Privacy Rule and Public Health.”

Figure 3. CDC Foodborne Illness Timeline, *Salmonella*



Source: "Timeline for Reporting Cases of Salmonella Infection," accessed May 16, 2015, <http://www.cdc.gov/salmonella/resources/timeline-for-reporting-of-cases.pdf>.

H. THE NEED FOR RAPID AND COORDINATED OUTBREAK RESPONSE

Outbreaks do not always fit neatly into the boundaries of one jurisdiction or regulatory body. Having pre-existing affiliations with neighboring or oversight agencies can be beneficial in streamlining responses. In studying interagency communication networks during emergencies, Naim Kapucu suggests that more networking in the preparation for disasters is essential. He quotes a New York official contending that issues with communication are not due to technology or policy; rather, they are a result of not taking the time to know the staff at key organizations.¹¹⁰ It could be argued that a personal network of contacts often makes it possible to obtain information or responses quicker than formal channels that can be the cause of bureaucratic delays. This method is not the optimal way the system should function. Considering outbreak response, such pre-event interactions may be difficult to attain, given the wide variety of agencies and personnel that can be involved in resolving a food-related epidemic. A 2014 report by the Congressional Research Service (CRS) notes that, in addition to state and local governments, food safety is regulated by up to 15 federal agencies.¹¹¹ The lack of guidance or plans for communication can foster the siloing of response efforts. The CRS report agrees, and notes that the mosaic of federal agencies involved in food safety often results in the unnecessary duplication of regulatory endeavors.¹¹²

I. THE COMPLEXITY OF THE GOVERNMENTAL STRUCTURE FOR FOOD PROTECTION

No one department or agency within U.S. government has exclusive responsibility for food safety and foodborne outbreak prevention and response; rather, the safety of this nation's food supply is a partnership effort. Establishing and sustaining partnerships and integrating communication among all levels of government is the only way to assure significant progress in reducing and preventing foodborne outbreaks.

¹¹⁰ Kapucu, "Interagency Communication Networks During Emergencies, Boundary Spanners in Multiagency Coordination," 219.

¹¹¹ Renée Johnson, *The Federal Food System: A Primer* (CRS Report No. 7-5700) (Washington, DC: Congressional Research Service, 2015), <http://fpc.state.gov/documents/organization/201511.pdf>.

¹¹² Ibid.

J. ROLE OF FEDERAL AGENCIES

The federal government has established authorities to oversee the response for outbreaks, and the HHS is the principal national agency overseeing the health of the American people. Included in its many obligations, the HHS has the fundamental oversight of a federal public health response if a bioterrorist incident occurs in food, due to the essential response expertise of public health and medical emergency responders. The HHS operates under the National Response Framework (NRF) in all situations involving an “incident of national significance.” This type of incident is defined in the NRF as “an actual or potential high-impact event that requires a coordinated and effective response by an appropriate combination of federal, state, local, tribal, and nongovernmental and/or private sector entities in order to save lives and minimize damage and provide the basis for long-term community recovery and mitigation activities.”¹¹³

Emergency support function (ESF) #8 of the NRF is the document providing guidance for public health and medical relief in instances of emergencies declared by the federal government. This area is the designated responsibility of the HHS in support of state, local, and tribal jurisdictions. The HHS undertakes this obligation with the DHS, which has the all-embracing authority for managing domestic incidents.¹¹⁴ During a federal emergency, the HHS is also responsible for health-related situational awareness, such as public health disease surveillance, and communications to best utilize public health and medical assets.¹¹⁵

¹¹³ U.S. Department of Homeland Security, *National Response Framework* (Washington, DC: U.S. Department of Homeland Security, 2013), 5.

¹¹⁴ U.S. Department of Health and Human Services, *Terrorism and Other Public Health Emergencies: A Reference Guide for Media* (Washington, DC: Food and Drug Administration, 2005), 143.

¹¹⁵ *Ibid.*

More routinely, the HHS is also responsible for safeguarding the food system, including animals that produce food, and the feed they eat through the efforts of the following key agencies:

- Centers for Disease Control and Prevention: The CDC works with state health agencies to conduct disease surveillance and monitor data on morbidity and mortality.
- Food and Drug Administration: The FDA is the regulatory body for domestic and imported food and animal feed, except for commodities under the jurisdiction of the USDA/FSIS.¹¹⁶
- Department of Agriculture: The USDA has authority over processed meat, poultry, and egg products through the FSIS. In addition, the USDA monitors animal and plant disease through the Animal and Plant Health Inspection Service (APHIS), and administers recommendations on nutrition through the Food and Nutrition Service (FNS).¹¹⁷

These three agencies—CDC, FDA and USDA—are the main federal players in foodborne outbreak prevention and control. On a daily basis, they are involved in a variety of functions to assure a safe food supply, and may be actively engaged in outbreak response. Not to say they are in this alone; the works of state, tribal, local, and territorial (STLT) public health agencies accompany their efforts. The complexity and logistics of communication between so many entities can lead to a variety of coordination difficulties.

A brief description of these agencies' roles during outbreak response is outlined as follows.

1. Centers for Disease Control and Prevention

The CDC is a non-regulatory agency, charged with—as its name implies—developing and applying disease control and prevention strategies. It works to determine the parameters of an outbreak by linking together reports of cases or clusters of ill persons. It is the lead federal agency that gathers data and compiles statistics on all

¹¹⁶ U.S. Department of Health and Human Services, *Terrorism and Other Public Health Emergencies: A Reference Guide for Media*, 143.

¹¹⁷ *Ibid.*, 7–8.

aspects of foodborne illnesses and outbreaks, including ascertaining the efficacy of disease control methods.¹¹⁸ It also administers a number of electronic systems, such as FoodNet and PulseNet, to collect and analyze outbreak data. These systems, and others, are discussed at length later in this chapter.¹¹⁹

In the case of widespread foodborne illness, it routinely collaborates on a federal level with the FDA and USDA-FSIS, and links federal agencies, state and local public health professionals, and other public health partners, in efforts to detect and define outbreaks, and determine the cause. In addition, it endeavors to bolster the capabilities of disease detection, public health labs, and environmental health (EH) at state and local levels.¹²⁰

2. Food and Drug Administration

Eighty percent of food ingested in the United States is entrusted to the care of the FDA.¹²¹ As described previously, the FDA is the regulatory body for domestic and imported food and animal feed, except for commodities under the jurisdiction of the USDA/FSIS. It regulates the food industry through inspection, education, and enforcement, and also assists in outbreak investigation and response when one of the products it oversees may be implicated. As part of the outbreak response, the FDA may test, traceback, or recall food products.¹²²

It may also inspect and access food production systems in farms, processing/packaging facilities, or retail establishments. In addition, it evaluates all outbreak information to prevent future problems through policy change or guidance updates.

¹¹⁸ “What You Should Know About Government Response to Foodborne Illness Outbreaks.”

¹¹⁹ “What You Should Know About Government Response to Foodborne Illness Outbreaks.”

¹²⁰ “Selected Federal Agencies with a Role in Food Safety,” accessed January 15, 2015, <http://www.foodsafety.gov/about/federal/>.

¹²¹ “Foodborne Outbreaks,” accessed June 8, 2015, <http://www.cdc.gov/foodsafety/outbreaks/>.

¹²² Ibid.

Often, its food protection and outbreak response is augmented by state and local health departments.¹²³

3. United States Department of Agriculture Food Safety and Inspection Service

The USDA-FSIS oversees domestic and imported meat, and poultry and egg products, and assures these products have proper labels and packaging, and are handled in ways that guarantees safety and wholesomeness.¹²⁴ During outbreaks, like the FDA, the USDA-FSIS may test products, conduct tracebacks, announce recalls, and access food safety measures in facilities where regulated food is processed. The FSIS may collaborate with health agencies at the federal, state, and local level. It also looks to collect, consolidate, and analyze data to assure the food supply remains safe.¹²⁵

K. THE ROLE OF STATE AND LOCAL HEALTH AGENCIES

Although federal agencies have an oversight role, the state, local, and tribal governments have the primary responsibility to assure food safety in their jurisdictions, including prompt responses to food emergencies.¹²⁶ Depending on the structure of the state, and the jurisdiction(s) where an outbreak is active, response and responsibility may be in the purview of the state departments of health, agriculture, environment, or a regional, county, or local health agency.

¹²³ U.S. Department of Homeland Security, *National Infrastructure Protection Plan Agriculture and Food Sector* (Washington, DC: U.S. Department of Homeland Security, 2007), 1–2.

¹²⁴ U.S. Department of Homeland Security, *National Infrastructure Protection Plan Agriculture and Food Sector*, 1–2.

¹²⁵ “Key Players in Foodborne Outbreak Response.”

¹²⁶ *Ibid.*

1. State Agencies

Given their number and authorities, state agencies are sizeable players in foodborne outbreak detection and response. At the state level, agencies conduct and coordinate routine disease surveillance, and oversee outbreak response within their state's geography. States assure responses to outbreaks that span multiple jurisdictions, and report data and findings to the CDC.¹²⁷ During widespread outbreaks, or outbreaks of significance, they work closely with the federal agencies, and are often the state points-of-contact for outbreak-related communications.

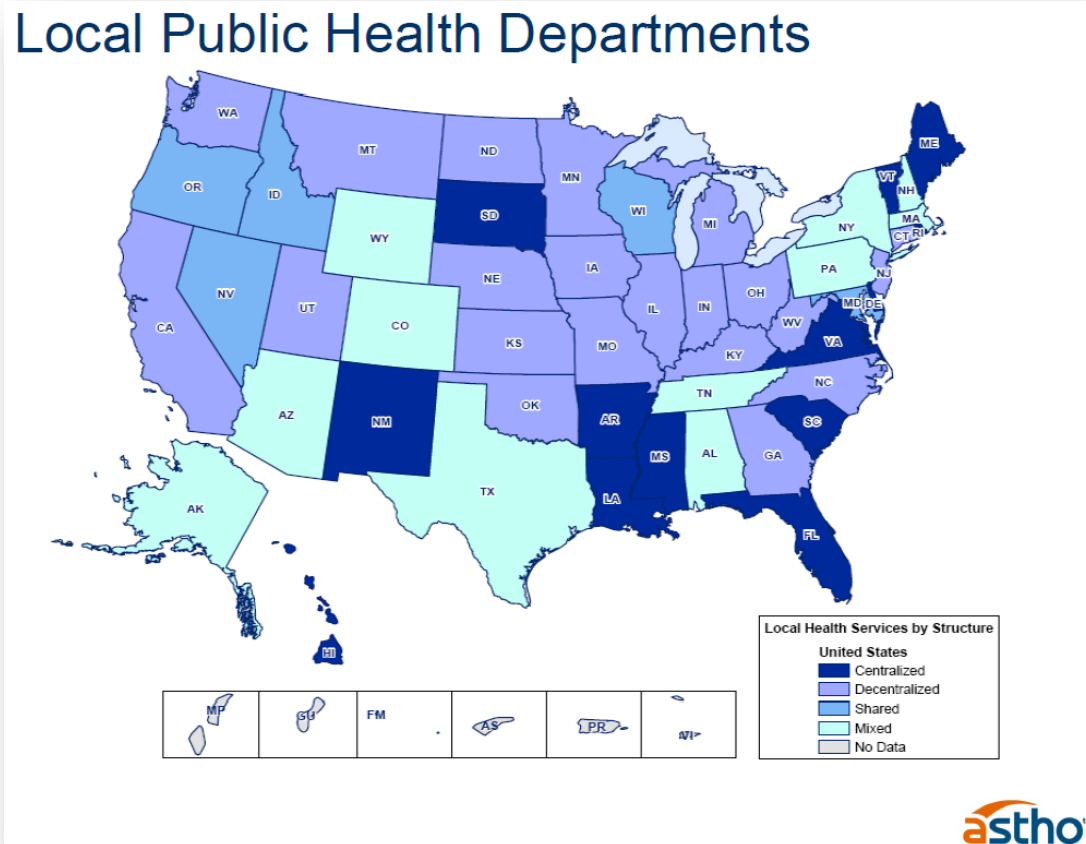
2. Local Agencies

During an outbreak, local health agencies are often the boots-on-the-ground for investigation. Their responsibilities include inspection and oversight of a variety of food facilities, and often sleuthing for environmental factors that may contribute to illness. These agencies are local points of contact for health care providers, clinical laboratories, and concerned or ill members of the public for surveillance and reporting.

The lead agency, and the interplay and coordination of outbreak activities within a state, is often dependent upon a state's organizational structure. The architecture of a state's governance system lays out which agency, or agencies, hold primary oversight and responsibility. Highly centralized states may have more direct control over local activities, whereas decentralized states may need to request the cooperation of local health authorities in outbreak activities. See Figure 4 and Table 1.

¹²⁷ U.S. Department of Homeland Security, *National Infrastructure Protection Plan Agriculture and Food Sector*, 1–2.

Figure 4. Architecture of Local Public Health Departments



Source: David Bergmire-Sweat, “Experiences and Challenges with Outbreak Response and Investigation: A State Health Agency Perspective,” presented at The Better Communications, Better Public Health Outcomes Summit, Saint Louis, Missouri, May 15–16, 2008.

Table 1. State and Local Health Department Governance Classification System

Centralized/ Largely Centralized	Local health units are primarily led by employees of the state and the state retains authority over most fiscal decisions	
	Centralized states: AR, DE, C, HI, MS, NM, RI, SC, VT	Largely Centralized states: AL, LA, NH, SD, VA
Shared	Local health units may be led by employees of the state or of local government. If they are led by state employees, then local government has authority to make fiscal decisions and/or issue public health orders.	
	Shared states: FL, GA, KY	Largely Shared states: MD
Mixed	Some local health units are led by employees of the state and some are led by employees of local government. No one arrangement predominates in the state.	
	Mixed states: AK, ME, OK, PA, TN, WY	
Decentralized/ Largely Decentralized	Local health units are primarily led by employees of local governments and the local governments retain authority over most fiscal decisions.	
	Decentralized states: AZ, CA, CO, CT, ID, IL, IN, IA, KS, MA, MI, MN, MO, MT, NE, NJ, NY, NC, ND, OH, OR, UT, WA, WV, WI	Largely decentralized states: NV, TX

Source: Association of State and Territorial Health Officials, *State and Local Health Department Governance Classification System* (Washington, DC: Association of State and Territorial Health Officials, 2012), <http://www.astho.org/Research/Data-and-Analysis/State-and-Local-Governance-Classification-Tree/>.

Noting the variations in state structures, it is easy to see how inter- and intra-agency and multi-agency coordination, and the flow of necessary communications can be discontinuous. Each jurisdiction has its own procedures, and some have more funding and resources than others. Similarly, the manner in which states approach disease surveillance varies. Oversight responsibilities can be granted to local agencies, a central state office, or regional health offices.¹²⁸ Overall, the responsible public health agencies for oversight and investigation of foodborne illnesses may vary throughout an outbreak investigation. As the CDC describes, whether one or more health agencies contribute to the investigation will be dependent upon the outbreak size and scope. One agency may

¹²⁸ Annys Shin, "Slow to Pick up the Pepper Trail," *Washington Post*, July 30, 2008, <http://www.washingtonpost.com/wp-dyn/content/article/2008/07/29/AR2008072902287>.

initiate a response, and include other partner agencies if the investigation expands in size or across jurisdictional boundaries.¹²⁹

Again, collaboration and communication are key to assuring an outbreak is appropriately and rapidly identified and addressed by the responding health agencies.

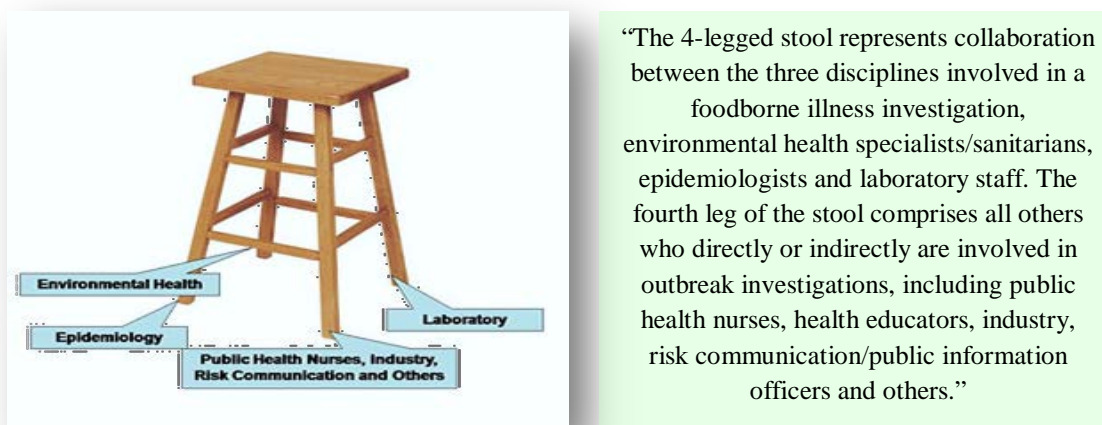
Regardless of the structure of the health authorities within a state, response activities for foodborne outbreaks are comparable across the United States. Several key professional disciplines and their corresponding competencies are generally recognized as the cornerstones of outbreak response:

- Sanitarians (also known as environmental health specialists), perform investigations, identify food safety hazards, conduct sampling, and set interventions in place to reduce or eliminate hazards that contribute to foodborne illness.
- Epidemiologists study the occurrence of disease, conduct surveillance for illness, create hypotheses for the cause/source, and perform analytic diagnostics to ascertain the progression of outbreaks in a population.
- Laboratory personnel analyze samples (environmental, food, clinical) for chemical or microbiological presence, interpret results, and advise on collection, handling, storage, and transport of specimens related to an outbreak.

As these three disciplines are reliant on information from each other for the rapid detection of outbreaks, the identification of the disease and its source, and setting controls in place to stem the chain of illness, coordination, communication and teamwork is essential. This shared responsibility for outbreak prevention and response is often pictured as a four-legged stool, one leg for each of the sanitarians, epidemiologists and laboratory personnel. The fourth leg is representative of other essential stakeholders in outbreak response: health educators, public information officers, health care professionals and others. A visual of this collaboration model can be seen in Figure 5.

¹²⁹ “Key Players in Foodborne Outbreak Response.”

Figure 5. The Four-Legged Stool of Foodborne Outbreak Response



Source: “Epi-Ready Team Training,” accessed June 8, 2015, <http://www.neha.org/professional-development/education-and-training/epi-ready-team-training-foodborne-illness-response>.

L. CHALLENGES

Outbreak investigations are not without their challenges, given the necessity for teamwork and rapid, continued bi-directional interagency communication to assure timely and appropriate response. The FDA recognized as much in a 2013 report to Congress, in which it identified coordination and communication among state, local, tribal, and federal officials as an area to strengthen.

Information sharing, as elemental as it may seem, is not that simple. The FDA, for instance, is limited by statute in its ability to share certain types of information with state and local partners. Some mechanisms exist to share certain types of information with states; however, many states have not taken this opportunity or maintained agreements to do so.¹³⁰

In 2007, the GAO considered federal oversight of food safety to be an area of concern and high-risk. In the GAO’s assessment, the current approach to protecting the U.S. food supply was in need of widespread transformation to work efficiently, assure

¹³⁰ U.S. Food and Drug Administration, *Ensuring a Safe Food Supply* (Washington, DC: U.S. Food and Drug Administration, 2013), 54, <http://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM351876.pdf>.

accountability, and to certify long-term and continuous effectiveness.¹³¹ The GAO also noted the fragmentation of this nation's food safety system, and asserted integration of this system as a primary challenge to be addressed.¹³²

Many of the high-level talks about improving the food safety system are directed towards the integration at federal level agencies, with only limited attention paid to an integrated vertical system that incorporates federal, state, and local public agencies with food safety responsibilities. This issue is significant, as inter-agency collaborations and cooperation are necessary given that local agencies may be less equipped or prepared to respond to foodborne epidemics, encounter personnel and staffing shortages, and are dependent upon backing from state and federal partners to respond to large outbreaks.¹³³

In the wake of an outbreak, some public health agencies that normally are not involved in foodborne outbreak investigations suddenly are responsible for overseeing a course of action for which they may be inadequately staffed or prepared. Outbreaks occur unexpectedly, and agencies may have capacity issues with handling the additional work, as described by the National Environmental Health Association (NEHA):

Staff who conduct these investigations usually have many responsibilities in addition to foodborne disease. Many local health agencies do not have robust or updated protocols to guide investigation and response. In fact, agencies with responsibility for foodborne illness response, control, and prevention should have a variety of available resources, which are often lacking. These include personnel experience, training, and a system to share expertise and data with partner agencies.¹³⁴

¹³¹ U.S. Government Accountability Office, *High Risk Series, An Update* (GAO-07-310) (Washington, DC: U.S. Government Accountability Office, 2007), <http://www.gao.gov/new.items/d07310.pdf>.

¹³² Ibid.

¹³³ National Environmental Health Association (NEHA), *Assessment of Foodborne Illness Outbreak Response and Investigation Capacity in US Environmental Health Food Safety Regulatory Programs* (Denver, CO: National Environmental Health Association (NEHA), 2013), 13.

¹³⁴ Ibid., 6.

Some state and local public health professionals have obtained insufficient training in how to conduct foodborne disease investigations, and may have limited experience in this area.¹³⁵

In 2014, the NEHA released the results of a local and state agency capacity assessment concentrating on the area of foodborne outbreak response.

The findings expressed concern over “the potential impacts of ongoing budget reductions on staffing, training, outbreak response, control and prevention activities, as well as the current status of interagency cooperation to share resources.”¹³⁶

All levels of governmental food safety oversight, and their respective outbreak teams, need to have sufficient resources to be in direct and frequent communication with their respective counterparts about laboratory results, investigation particulars, and policy decisions to assure decisive and coordinated responses.

M. COMMUNICATION VS. INFORMATION VS. COLLABORATION VS. COORDINATION

The single biggest problem in communication is the illusion that it has taken place.

~ George Bernard Shaw¹³⁷

Communication, at its most elemental, is the transfer of a message from one person to another. A common vocabulary is essential to assure understanding and situational awareness during an event, such as a foodborne outbreak. The varying agencies and audiences involved need to be assured they clearly comprehend the matter at hand, and what is expected of all response participants.

Communication is most effective when it is bi-directional, so that senders have verification that their transmission was delivered to—and understood by—the intended

¹³⁵ Guzewich, “No Quick Fixes for Outbreak Surveillance and Response.”

¹³⁶ National Environmental Health Association (NEHA), *Assessment of Foodborne Illness Outbreak Response and Investigation Capacity in US Environmental Health Food Safety Regulatory Programs*, 5.

¹³⁷ “George Bernard Shaw Quotes,” accessed January 15, 2015, <http://www.brainyquote.com/quotes/quotes/g/georgebern385438.html>.

audience. Assuring information is exchanged via a multi-directional and multi-agency process is an essential component in satisfying the public health system's responsibility to conduct emergency responses effectively. If public health professionals cannot communicate effectively, and if essential information transfer is not guaranteed, the successful management of a situation is not likely.¹³⁸

In business, when speaking of correspondence between people or agencies, communication denotes a two-way exchange; the exchange of information, facts or knowledge tends to be unidirectional. Information can be imparted passively or actively, depending on whether it is pushed (sent out to others) or pulled (is industriously sought). Collaboration is usually understood to be analogous to teamwork. It is defined as working jointly on an activity, especially to produce or create something. However, as NACCHO points out in its "Pulling Together" resource for local health departments, a standard definition or application of collaboration does not exist, and public health professionals may have their own unique definitions. NACCHO goes on to note that "common to most definitions of collaboration are the concepts of shared labor, a shared purpose or goal, and joint ownership of the work, risks, results, and rewards."¹³⁹

As multiple partners or agencies may be necessary for a robust outbreak response, their collective efforts should optimally be coordinated or combined harmoniously. Such coordination, as described by Kapucu, can be understood, "as the degree to which there are adequate networks among the organizational parts for intra-organizational communication or among the organizations for inter-organizational communication to accomplish goals."¹⁴⁰ Mishra and Mishra define this organizational communication further, as using speech, signs, script, or other methods to transfer information, thoughts, or opinions. Additionally, they discuss organizational collaboration as a synthesis of

¹³⁸ Kapucu, "Interagency Communication Networks During Emergencies, Boundary Spanners in Multiagency Coordination," 209.

¹³⁹ National Association of County and City Health Officials (NACCHO), "Pulling Together 5," accessed January 3, 2016, <http://archived.naccho.org/topics/environmental/pullingtogether/sectiontwo.cfm>.

¹⁴⁰ Kapucu, "Interagency Communication Networks During Emergencies, Boundary Spanners in Multiagency Coordination," 219.

individual and group interaction comprised of deeds and communication methods to solve complex issues.¹⁴¹

In its assessment of foodborne outbreak response, NEHA describes interagency coordination between public health partners. The association points out that the complexity of information and coordination required for effective investigations can be a barrier to harmonious multi-agency interactions. When more than one agency is involved in a response, the duplication or omission of essential investigative steps is entirely possible, which can potentially lead to delays in the identification of the outbreak source. The misdirection of incident management can also lead to increased public risk, further cases of disease, and unnecessary economic impact to the food industry.¹⁴²

In business vernacular, is not unusual for the terms communication, information, coordination, and collaboration to be used interchangeably. In practice, information delivery may be the simplest to achieve, as response or dialogue may not be necessary to the transfer. Communicating, or creating a dialogue, is more exacting because an interface between two or more entities is involved. Most challenging of all is fostering collaboration, as understanding, idea exchange, and collective engagement are essential ingredients to its success.

In government interactions, both internal and between agencies, defining these terms can prevent misunderstandings and help with moving all parties toward a common goal; especially, in consideration of public health emergencies, such as foodborne outbreak response. Sadly, barriers to efficient communication and collaboration do exist. Health agencies, while ultimately focused on reducing disease and death, each have unique missions, goals, and authority. As NACCHO explains, although the overarching purpose of public health agencies should be interconnected, variations in procedures, protocols, and visions between agencies can cause conflict or confusion during joint response situations. Systemic hurdles to interagency collaboration exist, as no two health

¹⁴¹ Deepti Mishra and Alok Mishra, "Effective Communication, Collaboration, and Coordination in Extreme Programming: Human-Centric Perspective in a Small Organization," *Human Factors and Ergonomics in Manufacturing* 5 (2009): 438, doi:10.1002/hfm.20164.

¹⁴² National Environmental Health Association (NEHA), *Assessment of Foodborne Illness Outbreak Response and Investigation Capacity in US Environmental Health Food Safety Regulatory Programs*, 16.

agencies are alike. Resources can vary widely, and the entire system is fragmented across federal, state, and local levels.¹⁴³

Further, NACCHO notes interagency efforts can sometimes become an obstacle to effective response. Issues that can hamper information, communication and/or collaboration include:

- Ideology—Potential collaborators have substantially differing ideologies, values, and/or beliefs.
- Leadership—Either no one has enough power to bring the key players together or the “wrong person” leads the meetings.
- Power—Power must be shared even if it is not equal among members.
- History—Potential collaborators have a history of past conflict or failure.
- Competition—Potential collaborators maintain existing competition.
- Resources—Lack of necessary personnel, time, and skills to contribute to the effort.¹⁴⁴

Recognizing and understanding the nuances of information, communication and collaboration is essential when considering outbreak response documents, in that the lack of common understanding can prevent situational awareness and an expeditious response of stakeholders. Kapucu mused that fractured communication continuity is a barrier to coordination among multiple organizations.¹⁴⁵ Indeed, numerous federal reports address the need for improvement in food safety coordination in this nation. For instance, the GAO, in studying safety issues that afflict the U.S. food supply, observed that planning and coordination can address problematic issues of complementary outbreak management by multiple federal agencies. The USDA-FSIS addresses collaboration among internal and external stakeholders to prevent foodborne illness as a priority in its 2011–2016 strategic plan. The CDC observes that state and local outbreak information sharing with its agency is voluntary.

¹⁴³ National Association of County and City Health Officials (NACCHO), “Pulling Together 5.”

¹⁴⁴ Ibid.

¹⁴⁵ Kapucu, “Interagency Communication Networks During Emergencies, Boundary Spanners in Multiagency Coordination,” 209.

Foodborne outbreak investigations may be hampered by communication issues and confusion over response roles and responsibilities. These challenges are obstacles for response at all levels of government. The failure to share information on outbreaks can inhibit a complete picture of outbreak burden in the United States, and inhibit not only outbreak interruption, but also the understanding of the pathogens, foods, settings, contributing factors and human health impact of outbreaks. The public health system needs a systematic, coordinated and comprehensive strategy to assure and improve routine and emergency foodborne outbreak communications.

N. EXISTING SURVEILLANCE AND RESPONSE NETWORKS

Modern technology is dynamic and new electronic applications are aggressively brought to the consumer market on a regular basis. Similarly, dynamic and effective applications to exchange food safety data should be made available to the public health sector to assure communications and response initiatives are modern and appropriate to emerging needs. Although electronic portal and exchanges do exist at the federal level, many were purpose built for defined purposes, and have not kept pace with contemporary needs. In addition, multiple data exchange initiatives from a variety of federal, academic, and non-governmental organizations require health officials to check into a number of disparate systems for food protection or outbreak information and updates. As the Association of Public Health Laboratories (APHL) promulgates, “In order to ensure an integrated food safety system, these data initiatives will have to work in concert with each other to allow for seamless and interoperable data exchange.”¹⁴⁶

In addressing the issues surrounding multi-jurisdictional outbreak communications, the Council of State and Territorial Epidemiologists (CSTE) observes that “through the introduction of electronic disease surveillance systems, states and localities have worked to migrate disparate and siloed legacy surveillance systems into more integrated surveillance platforms. The goals for surveillance system integration are

¹⁴⁶ Association of Public Health Laboratories (APHL), *Discovery Document: Data Exchange among Food and Feed-Testing Laboratories and FDA’s eLEXNET* (Silver Spring, MD: Association of Public Health Laboratories (APHL), 2013), 1.

to utilize national standards, reduce redundancy, streamline reporting, understand disease and risk factor interactions, and increase data sharing.”¹⁴⁷

Over the past two decades, the launch and use of electronic platforms for professional notification or exchange of information related to foodborne disease incidents between local health departments, states, and federal agencies have increased. Some of these platforms are discipline specific, aimed at epidemiological information or laboratory data, such as food and feed testing information. Others are more holistic and used by a variety of professional positions within public health agencies. All contain essential information to help direct decision making in outbreak response. The following sections discuss the most common network initiatives used for interagency outbreak communication in the United States.

1. National Electronic Norovirus Outbreak Network

Named after caliciviruses, the National Norovirus Outbreak Network, or CaliciNet (<http://www.cdc.gov/norovirus/reporting/calicinet>), connects 25 subscribed states working collectively and rapidly to identify emerging norovirus strains and their implicated food sources. CaliciNet is linked to the National Outbreak Reporting System (NORS).¹⁴⁸

2. Common Organizational Registry Environment SHIELD

The Common Organizational Registry Environment SHIELD, or CoreSHIELD, is a secure online hub providing federal, state, and local public health agencies and industry partners with a platform for a variety of food and agriculture critical infrastructure networks, including FoodSHIELD, and the Food Emergency Response Network (FERN), among others. Created by the Food Protection and Defense Institute (FPDI) (formerly the National Center for Food Protection and Defense) at the University of Minnesota,

¹⁴⁷ Megan Davies, “The Rocky Road to Complete Reportable Infectious Disease System Integration,” *Council of State and Territorial Epidemiologists Blog*, February 26, 2014, <http://www.cste.org/blogpost/1084057/182129/The-rocky-road-to-complete-reportable-infectious-disease-system-integration?hhSearchTerms=%22data+and+systems%22&terms>.

¹⁴⁸ “Reporting and Surveillance for Norovirus,” accessed May 8, 2015, <http://www.cdc.gov/norovirus/reporting/calicinet>.

CoreSHIELD also provides for education and training in the areas of food protection and defense.

Funding for CoreSHIELD includes the following agencies: the FDA, DHS, USDA, and others.¹⁴⁹

3. Electronic Laboratory Exchange Network

The Electronic Laboratory Exchange Network (<https://www.elexnet.com>), or eLEXNET, is an integrated, secure network created to help align the collective efforts of public health laboratories in the United States. Through this exchange network, professionals can review and analyze lab data, and discuss and coordinate findings. eLEXNET is the official repository for several tracking systems, including FERN.

Funding for eLEXNET comes from the FDA, USDA, and the Department of Defense (DOD).¹⁵⁰

4. The Epidemic Information Exchange

The CDC oversees the rapid communication portal, Epi-X (Epidemic Information Exchange), exclusively for those in public health responsible for identifying, investigating, and responding to health threats. The Epi-X website (<http://www.cdc.gov/epix>) provides a secure platform for the sharing of disease reports and related surveillance data. In addition, Epi-X can push out information to its subscribers via email, pagers, or telephone connections.¹⁵¹

5. Electronic State Access to FACTS

The FDA maintains an electronic platform for its contractual regulatory partners. Electronic State Access to FACTS, or eSAF, is an external electronic web portal maintained by FDA's Office on Partnerships to track and exchange inspection

¹⁴⁹ U.S. Food and Drug Association, *Ensuring a Safe Food Supply*, 53; Food Protection and Defense Institute (FPDI), *CoreSHIELD* (St. Paul, MN: Food Protection and Defense Institute (FPDI), 2015), http://foodprotection.umn.edu/sites/default/files/coreshield_2015-09-09.pdf.

¹⁵⁰ Association of Public Health Laboratories (APHL), *Discovery Document: Data Exchange among Food and Feed-Testing Laboratories and FDA's eLEXNET*, 2, 24.

¹⁵¹ "The Epidemic Information Exchange," accessed May 8, 2015, <http://www.cdc.gov/epix/>.

information with contractual regulatory partners via the automated Field Accomplishments and Compliance Tracking System (FACTS) electronic system. eSAF was scheduled to be retired as of March 2014.¹⁵²

6. Field Accomplishments and Compliance Tracking Systems

The FDA automated tracking system FACTS is used by the Office of Regulatory Affairs (ORA) to oversee aspects of field assignments and centralize data related to this work. A portion of the information from FACTS is transferred daily to the Electronic Laboratory Exchange Network (eLEXNET), which accounts for approximately 65% of the data contained.¹⁵³

7. FDA Office of Partnerships Mailing List

For federal, state, local, tribal, territorial, and industry partners working under an FDA agreement, the FDA Office on Partnerships maintains a mailing list to distribute essential technical information based on areas of responsibility. The Office of Partnerships also provides resources, such as policy guides and rapid response team (RRT) manuals.¹⁵⁴

8. Food Emergency Response Network

FERN is a collaborative USDA-FDA design that connects and integrates the nation's public health food testing laboratories through a secure online portal. This web platform (<http://fernlab.org>) encourages state inter-agency participation, as it gathers information related to biological, chemical, or radiological contamination of food.¹⁵⁵

¹⁵² U.S. Government Accountability Office, *Information Technology: FDA Needs to Fully Implement Key Management Practices to Lessen Modernization Risks* (GAO-12-346) (Washington, DC: U.S. Government Accountability Office, 2012), 22; Association of Public Health Laboratories (APHL), *Discovery Document: Data Exchange Among Food and Feed-Testing Laboratories and FDA's eLEXNET*, 8; "Communication between FDA, State, Local and Tribal Health Officials," accessed February 2, 2015, <http://www.fda.gov/ForFederalStateandLocalOfficials/Office%20of%20Partnerships%20Contacts/CommunicationsBetweenFDAandStateLocalOfficials/default.htm>.

¹⁵³ "Field Science and Laboratories," accessed September 18, 2015, <http://www.fda.gov/ScienceResearch/FieldScience/ucm171913.htm>.

¹⁵⁴ "Communication between FDA, State, Local and Tribal Health Officials."

¹⁵⁵ "Food Emergency Response Network (FERN)," accessed February 2, 2015, <http://fernlab.org>.

9. Foodborne Diseases Centers for Outbreak Response Enhancement

Ten state and local public health agencies, representing about 18% of the nation's population, receive funding from the CDC under the Foodborne Diseases Centers for Outbreak Response Enhancement (FoodCORE) project (<http://www.cdc.gov/foodcore>). FoodCORE fosters collaboration among the funded partners in areas related to identification of, and response to, foodborne outbreaks. The project also aims to create and establish enhanced methods of detecting and responding foodborne disease. Participating agencies include Colorado, Connecticut, New York City, Minnesota, Ohio, Oregon, South Carolina, Tennessee, Utah, and Wisconsin.¹⁵⁶

10. Foodborne Diseases Active Surveillance Network

FoodNet (www.cdc.gov/FoodNet) tracks trends in foodborne illnesses through active surveillance, and is an endeavor funded collaboratively by the CDC, FDA and USDA. A joint project with 10 funded states, the area under surveillance encompasses approximately 15% of the U.S. population. The participating agencies for FoodNet are California, Colorado, Connecticut, Georgia, Maryland, Minnesota, New Mexico, New York, Oregon, and Tennessee.¹⁵⁷

11. FoodSHIELD

A comprehensive web-based system for agencies, laboratories, and professionals working at all levels of government in food and agriculture systems, FoodSHIELD (<https://www.FoodSHIELD.org>) facilitates interaction and communication among its participants. A project developed and sponsored by the FPDI, its focus is on collaboration, information sharing, and education/training.¹⁵⁸

¹⁵⁶ "Foodborne Diseases Centers for Outbreak Response Enhancement," <http://www.cdc.gov/foodcore/>, accessed February 2, 2015, www.cdc.gov/foodcore.

¹⁵⁷ "Foodborne Diseases Active Surveillance Network," accessed February 2, 2015, www.cdc.gov/FoodNet.

¹⁵⁸ U.S. Department of Homeland Security, U.S. Food and Drug Administration, and U.S. Department of Agriculture, *2011 Sector Critical Infrastructure Protection Annual Report for the Food and Agriculture Sector*, 26.

12. Health Alert Network

A service of the CDC, the Health Alert Network (HAN) (<http://emergency.cdc.gov/han/>) is an electronic emergency notification system designed to push emergent public health notices and non-emergency information rapidly to federal, state, and local agencies, as well as relevant partners, such as clinicians and public health laboratories. This service is further augmented by many states that act as conduits to redistribute the messages to their own public health subscribers, often under distribution systems rebranded by the state health agency. It is estimated that this HAN pass-thru system reaches 90% of the states' populations.¹⁵⁹

13. Homeland Security Information Network

A secure online information portal, the Homeland Security Information Network (HSIN) (<http://www.dhs.gov/homeland-security-information-network-hsin>) is designed for governmental, international, and private sector homeland security partners to exchange sensitive but unclassified information necessary for the execution of their official duties. This system allows users a wide range of functions, including data analysis and sending messages including notifications and alerts. The Food and Agriculture Sector of the DHS has designated HSIN-FA and FoodSHIELD as its two principle collaboration portals to support its public and private sector partners.¹⁶⁰

14. National Notifiable Disease Surveillance System

As states are requested to share information voluntarily with the CDC regarding nationally notifiable diseases, the National Notifiable Disease Surveillance System (NNDSS) (<http://wwwn.cdc.gov/nndss/>) was created to provide for streamlined reporting and data gathering. Currently, 57 different public health jurisdictions participate in this voluntary system, but some designated diseases may not be considered as reportable in each state. This aggregation of information allows public health professionals to gauge morbidity rates and ascertain appropriate disease control measures. Based on current

¹⁵⁹ "Health Alert Network," accessed February 2, 2015, <http://emergency.cdc.gov/han/>.

¹⁶⁰ "Homeland Security Information Network," accessed February 2, 2015, <https://www.dhs.gov/homeland-security-information-network-hsin>.

trends, the listing of reportable diseases can vary over time, and is reviewed and updated annually by the CSTE, in collaboration with the CDC. Foodborne diseases designated as notifiable include botulism, cholera, hemolytic uremic syndrome (HUS), listeriosis (*Listeria*), salmonellosis (*Salmonella*), Shiga Toxin-producing *Escherichia coli* (STEC) infections, shigellosis (*Shigella*), and vibriosis.¹⁶¹

15. National Outbreak Reporting System

NORS, administered by the CDC, provides a web-based system (<http://www.cdc.gov/nors/>) for health partners at the state, local, and territorial levels to provide information voluntarily on enteric diseases. Information on foodborne epidemics caused by “bacterial, viral, parasitic, chemical, toxin and unknown agents”¹⁶² can be entered for review. In addition, this system accepts data on diseases spread from person-to-person, including those spread by water or animal contact. Electronic Foodborne Outbreak Reporting System (eFORS) preceded NORS as the CDC’s data transmission tool from 1998–2008.¹⁶³

16. OutbreakNet Enhanced

OutbreakNet Enhanced is an online collaborative (<http://www.cdc.gov/food-safety/outbreaknetenhanced/index.html>), which includes membership from all 50 states in a network of epidemiologists and other public health professionals involved in aspects of enteric outbreaks from food, water, and other sources. Considered a capacity building program, this connection allows the CDC, FDA, and USDA to network and share insights on best practices in foodborne outbreak response.¹⁶⁴

¹⁶¹ “Foodborne Illness Surveillance, Response, and Data Systems,” accessed November 11, 2015, <http://www.cdc.gov/foodborneburden/surveillance-systems.html>.

¹⁶² “About NORS,” accessed November 11, 2015, <http://www.cdc.gov/nors/about.html>.

¹⁶³ John P. Middaugh et al., “Using the Electronic Foodborne Outbreak Reporting System (eFORS) to Improve Foodborne Outbreak Surveillance, Investigations, and Program Evaluation,” *Journal of Environmental Health* 73 no. 2 (2010): 8–11.

¹⁶⁴ “OutbreakNet Enhanced,” accessed September 10, 2015, <http://www.cdc.gov/foodsafety/outbreak-netenhanced/index.html>.

17. PulseNet

PulseNet is a collaborative computer-based communication hub (<http://www.cdc.gov/pulsenet/>) that allows participants from laboratories, and federal, state, and local health agencies to share real-time information on identification, or fingerprinting, of bacteria, to help confirm and track foodborne outbreaks.¹⁶⁵

18. Public Health Information System

USDA/FSIS launched its Public Health Information System (PHIS) (<http://www.fsis.usda.gov/phis>) to replace a number of older online systems to provide a platform from which it can interact electronically with its partners. Created to streamline and enhance operations, this secure system allows the agency to collect and analyze data to assure safer food.¹⁶⁶

19. State Advisory Fax and Email System

To facilitate rapid communication with defined public health partners, the FDA Office of Partnerships oversees a broadcast system for the dissemination of alerts and emergency messages known as SAFES, the State Advisory Fax and Email System (<http://www.fda.gov/ForFederalStateandLocalOfficials/ucm373618.htm>). The mailing list for SAFES is restricted to state and local regulatory officials performing an FDA-related function.¹⁶⁷

20. STLT Collaboration Space

To enhance communications with public health partners on the STLT level, the CDC created an online sharing space for the ease of connectivity. This web portal

¹⁶⁵ Lonnie J. King, *Statement to U.S. Committee on Agriculture, Subcommittee on Horticulture and Organic Agriculture* (Washington, DC: Centers for Disease Control and Prevention, 2008), <http://www.cdc.gov/washington/testimony/2008/t20080730.htm>; “PulseNet,” accessed February 8, 2015, <http://www.cdc.gov/pulsenet/>.

¹⁶⁶ “Public Health Information System,” accessed September 18, 2015, <http://www.fsis.usda.gov/phis>.

¹⁶⁷ “Communication and Information Sharing,” accessed January 31, 2013, <http://www.fda.gov/ForFederalStateandLocalOfficials/CommunicationbetweenFDASStateLocalandTribalOfficials/default.htm>.

(<http://www.cdc.gov/stltpublichealth/collab-space>) provides all registered users with access to tools and assets, such as a communications resource center.¹⁶⁸

In 2013, the APHL issued a discovery document, which was a review of the myriad databases used to track laboratory testing and data for foodborne outbreaks. A number of these databases were defined previously. While valuable, APHL's document, focused on the laboratory aspects of outbreaks, illustrates only some of the major communication systems and electronic portals used for information and situational awareness in outbreak response; many others exist. A chart of APHL's findings from this document can be found in Table 2. Such an extensive listing begs the question, "how does a professional navigate so many existing information/communication avenues when responding to an outbreak?" The author proposed this question to several current employees of the CDC, with the assurance of confidentiality. In reply, the CDC staffers expressed frustration on the myriad portals used for interagency notification with comments, such as, "its numbing, it's just so much,"¹⁶⁹ "it's hard to crawl out of the weeds,"¹⁷⁰ "it's even confusing to us,"¹⁷¹ and "everyone has their own go-to communication portal."¹⁷² A realistic and very telling synopsis can be found in this response, "everyone realizes and gives lip service to coordination, but in reality, it's difficult to do because you have your own stuff to do."¹⁷³

¹⁶⁸ "State, Tribal, Local & Territorial Public Health Professionals Gateway," accessed July 20, 2015, <http://www.cdc.gov/stltpublichealth/>.

¹⁶⁹ Anonymous CDC employee, in discussion with the author, February 7, 2015.

¹⁷⁰ Ibid.

¹⁷¹ Ibid.

¹⁷² Ibid.

¹⁷³ Ibid.

Table 2. APHL Data Exchange Initiatives

Sponsor	Other participating organizations	Initiative	Description	Stakeholders	Objective	Maturity	Timeframe	Source	Notes
FDA	State laboratories	eSAF/FACTS	eSAF is the only external system FDA maintains to exchange inspection info with regulatory partners. States that perform contract inspections for FDA enter data into FACTS via eSAF.	FDA and state inspectors and regulatory officials	Provide portal through which states can enter inspection data into FACTS	About 10,000 state inspections have been recorded in the system.		FDA, "Q&A: Food Protection Plan," 2013	
FDA	USDA Laboratories	Food Emergency Response Network (FERN)	Network of 170+ laboratories that can provide a coordinated response to a foodborne emergency.	FDA, USDA, laboratories	Integrate food-testing laboratories into a network to respond to emergencies involving biological, chemical, or radiological contamination of food	170+ member laboratories	Developed in 2004	Sciaccitano, 2003	
FDA		Mission Accomplishment and Regulatory Compliance Services (MARCS)	MARCS consists of diverse applications and services that streamline ORA business processes and workflows and provide better access to information. These software applications and services will be implemented on shared technology platforms.	FDA ORA	Full and complete integration of FDA ORA internal systems, including district offices and laboratories	In development	2011-present	SRA, 2012	
FDA	CDC, USDA	National Antimicrobial Resistance Monitoring System (NARMS)	FoodNet, USDA, and CDC laboratories test a designated number of animal, human, and retail meat samples for certain microorganisms (e.g., Salmonella, Campylobacter, E. coli); further testing is done to determine antimicrobial resistance	FDA, USDA, CDC	Monitor antimicrobial susceptibility among enteric bacteria from humans, retail meats, and food animals.	In production	Human component began in 1996; animal component in 1997; retail meat component in 2002	FDA, 2010	
CDC	APHL, PHAS	Electronic Laboratory Response Technical Assistance (ELR TA)	ELR TA offers technical assistance to PHAs to develop and establish ELR data flows with their laboratory partners.	PHAs, laboratories (PHLs, commercial, hospital, etc.)	Enhance the ability of PHAs nationwide to receive and process ELR	Received 60+ requests from 20+ jurisdictions	Launched 2012	APHL, "ELR TA," Undated	

Table 2. APHL Data Exchange Initiatives (Continued)

Sponsor	Other participating organizations	Initiative	Description	Stakeholders	Objective	Maturity	Timeframe	Source	Notes
CDC	Palantir	Foodborne Disease Outbreak Investigation System (FDOIS)	FDOIS is powered by the Palantir Disease Response solution. CDC analysts have access to a special "user-friendly dashboard," as well as mapping applications	CDC epidemiologists	Integrate datasets from diverse sources, including PulseNet, the NORS, and other sources (e.g., investigation details, questionnaires)	Fully operational. CDC has used FDOIS to investigate dozens of outbreaks and has coordinated outbreak responses with seven states	Launched 2010; currently in use	Palantir, Impact Study	FDA has plans to use Palantir Disease Response as their disease investigation and response infrastructure
CDC	FDA, USDA, state health departments	Foodborne Diseases Active Surveillance Network (FoodNet)	FoodNet, part of the CDC's Emerging Infections Program (EIP), collects reports of infections from clinical laboratories in 10 states and conducts surveillance on 15% of the US population.	CDC, EIP sites	Monitor trends in foodborne illness over time and disseminate information about foodborne illness	In operation at 10 EIP sites	Began surveillance in 1996	CDC, "FoodNet," 2013	
CDC	APHL, FBI, laboratories	LRN	Integrated networks of state and local public health, federal, military, and international laboratories that can respond to bioterrorism (LRN-B), chemical terrorism (LRN-C), and other public health emergencies.	CDC epidemiologists, FBI	Ensure an effective laboratory response to bioterrorism by helping to improve the nation's PHL infrastructure	In production with 150+ laboratories	Became operational in 1999	CDC, "LRN," 2013	
CDC	Local and state health departments	National Outbreak Reporting System (NORS)	NORS is a web-based platform that allows local, state, and territorial health departments to enter reports of enteric disease outbreaks, as well as waterborne outbreaks of non-enteric disease. NORS collects data on many types of outbreaks, including foodborne enteric illness.	CDC epidemiologists, outbreak investigators	Monitor enteric disease outbreaks	In operation	Launched 2009	CDC, "NORS," 2013	Data collected includes date and location of the outbreak, the number of people who became ill and their symptoms, and the pathogen that caused the outbreak
CDC	APHL, PHLs	Public Health Laboratory Interoperability Project (PHLIP)	PHLIP is a collaborative effort between APHL and CDC to provide assistance with implementing viable electronic laboratory messaging solutions.	PHLs, CDC	Establish data flows between PHLs and CDC for electronic surveillance	In production with influenza electronic laboratory surveillance messages (ELSM)	2008-present	APHL, "PHLIP," Undated	

Table 2. APHL Data Exchange Initiatives (Continued)

Sponsor	Other participating organizations	Initiative	Description	Stakeholders	Objective	Maturity	Timeframe	Source	Notes
CDC	PHLS	PulseNet	Database managed by CDC that captures PFGE results for foodborne disease-related bacteria.	CDC epidemiologists, outbreak investigators	Identify clusters of foodborne disease that require intensive follow-up investigations	80,000 results entered per year; 180 clusters identified in 2012	1998-present	CDC, "PulseNet," 2013	
CDC	Palantir	System for Enteric Disease Response, Investigation and Coordination (SEDIC)	Database developed by the CDC Innovation Office to integrate epidemiological, laboratory, and traceback data from a variety of sources.	CDC epidemiologists	Integrate datasets from diverse sources	200 users in 45 state/local health departments, CDC, FDA, USDA FSIS enter data into a web browser	National rollout anticipated in 2013	Williams, 2013	
CIFOR	APHL, PHLS	Epi/Lab Integrated Reporting project	Pilot of 1 model site and 3 pilot sites to develop combined epi/lab reports in standard format that will eventually allow reporting between jurisdictions.	CIFOR, state health department epidemiologists	"A domestic, open-source application ... that combines multiple laboratory data into a single report."	Pilot project		APHL, supporting CIFOR," 2013	CIFOR is also working on a cost-benefit analysis of PulseNet
EPA	Laboratories	ERLN	A network of public and private laboratories that can be ramped up as needed to support large scale environmental responses	EPA	Provide decision-makers with analytical data to identify chemical, biological, and radiological contaminants during nationally significant incidents	In production; most state PHLS participate in ERLN and submit analytical results electronically through WebEDR.	Launched 2008	EPA, 2009	
ICLN	LRN, FERN, ERLN, DLN, NAHLN, NPDN	Integrated Consortium of Laboratory Networks (ICLN)	An MOA establishes a multi-agency commitment to the integration of multiple laboratory networks	DHS, CDC, USDA, DOD, EPA, DHHS	Establish a framework for coordinated, integrated responses to major incidents, including acts of terrorism	In operation	2005-present	ICLN, 2012	
National Center for Food Protection and Defense	FDA, USDA, APHL	FoodSHIELD	FoodSHIELD provides web-based tools that facilitate collaboration between regulatory agencies and laboratories and their affiliated workgroups.	Local, state and federal regulatory agencies and laboratories	Support regulatory agencies and laboratories in defending the food supply	In operation; 190+ workgroups using FoodSHIELD's web-based tools			
ONC/ S&I Framework	PHAs, Healthcare Providers, EHR vendors, CDC, FDA	Public Health Reporting Initiative (PHRI)	PHRI is working with Electronic Health Records (EHR) systems and EHR vendors to ensure EHR interoperability with public health information systems.	CDC, FDA, USDA, PHLS, Healthcare providers	Create new public health reporting objective for Meaningful Use Stage 3 to lay the ground work for public health population data reporting in the future	PHRI involves participation from 30+ users across 5 domains.	2011-present	Merriack interview	PHRI is not currently tackling immunizations or aggregate data.

Source: Association of Public Health Laboratories (APHL), *Discovery Document: Data Exchange among Food and Feed-Testing Laboratories and FDA's eLEXNET* (Silver Spring, MD: Association of Public Health Laboratories (APHL), 2013), 50–53.

Considering the best system or systems to use for rapid communication between agencies would need a thorough evaluation of need, cost, and applicability to all the public health agencies and professionals involved. Perhaps the situation is best conveyed in a 2013 Discovery Document from APHL, “Beyond these challenges, there are significant policy obstacles to address before any of these systems can be established as the primary communication portal for integrated federal-state-local outbreak communications. Any effort to improve outbreak communications and data exchange must address both the technical and policy issues.”¹⁷⁴ Overall, the intent of systemic assessment is to clarify and improve the entire process to assure clear communications and timely diffusion of the right information to the right people to prevent and respond to an actual or potential foodborne outbreak.

The need for improvement has not gone unnoticed, as illustrated by the recent history of federal attention to enhancing food safety in the United States.

O. FEDERAL FOOD SAFETY WORKING GROUP

In 2009, President Obama recognized the need for enhancements to the U.S. food safety system by establishing a multiagency Food Safety Working Group (FSWG) to align federal efforts in this area. The FSWG established priorities on three primary objectives: “prioritizing prevention, strengthening surveillance and enforcement, and improving response and recovery.”¹⁷⁵ Recommendations from the FSWG included strengthening public health epidemiology programs, improving state capacity, and requesting that state and local health partners review and amend their agency protocols for emergency situations to be consistent with the *CIFOR Guidelines for Foodborne Disease Outbreak Response*.¹⁷⁶ However, as reported by the GAO, the group has not met for at least three years.¹⁷⁷ The last item listed as a recent action on the FSWG’s website is

¹⁷⁴ Association of Public Health Laboratories (APHL), *Discovery Document: Data Exchange among Food and Feed-Testing Laboratories and FDA’s eLEXNET*, 2.

¹⁷⁵ “President’s Food Safety Working Group,” accessed December 17, 2015, <http://www.foodsafetyworkinggroup.gov/ContentLearn/HomeLearn.htm#4>.

¹⁷⁶ Ibid.

¹⁷⁷ Ibid.

its December 2011 progress report.¹⁷⁸ As of December 2015, no additional updates have been posted to the FSWG website.

1. Food Safety Modernization Act/Integrated Food Safety System

The long list of foodborne outbreaks that have occurred over the past decade¹⁷⁹ raised concerns among all levels of government as to areas in which the system could be improved. These concerns eventually prompted action in Washington to assure system-wide enhancements, which culminated in President Obama signing the Food Safety Modernization Act (FSMA) on January 4, 2011. FSMA calls for a national integrated food safety system (IFSS) focused on the prevention of foodborne illness outbreaks. It also recognizes the importance of improving outbreak detection and response¹⁸⁰ that includes enhanced partnerships at the local, state, and federal level.¹⁸¹

FSMA's primary goal is to assure all agencies with food safety responsibilities carry out their duties in an integrated fashion that unites local, state, and national agencies in efforts to prevent food safety outbreaks from happening, rather than just cleaning up the aftermath.¹⁸² Communication is integral to such enhanced partnerships, and reliable, efficient data exchange is essential to a coordinated response to foodborne disease outbreaks. This aim requires new approaches to food safety, including increased data-sharing capabilities.¹⁸³

The FSMA includes numerous provisions requiring interagency collaboration, but, as the GAO observed, such provisions are aimed at individual issues and do not

¹⁷⁸ U.S. Government Accountability Office, *High Risk: Revamping Federal Oversight of Food Safety* (GAO-15-290) (Washington, DC: U.S. Government Accountability Office, 2015, http://www.gao.gov/highrisk/risks/safety-security/food_safety.php).

¹⁷⁹ "List of Selected Multistate Foodborne Outbreak Investigations," accessed December 17, 2015, <http://www.cdc.gov/foodsafety/outbreaks/multistate-outbreaks/outbreaks-list.html>.

¹⁸⁰ U.S. Food and Drug Administration, *Ensuring a Safe Food Supply*, 18.

¹⁸¹ "FDA Food Safety Modernization Act (FSMA)," accessed November 17, 2015, <http://www.fda.gov/Food/GuidanceRegulation/FSMA/>.

¹⁸² Paul Priyesh Vijayakumar, Melissa Newman, and Gregg Rentfrow, *FDA's Food Safety Modernization Act: An Overview* (Lexington, KY: University of Kentucky College of Agriculture, 2015), https://www.uky.edu/fsic/Food_Modernization_Fact_Sheet.pdf.

¹⁸³ Association of Public Health Laboratories (APHL), *Discovery Document: Data Exchange among Food and Feed-Testing Laboratories and FDA's eLEXNET*, 3.

provide for the desired center-focused, umbrella connecting all food safety regulations and programs. Further, in December 2014, the GAO reported that 10 of 12 food safety experts they interviewed, “agreed a centralized collaborative mechanism on food safety is important to foster effective interagency collaboration and could enhance food safety oversight.”¹⁸⁴

2. 50-State Workshops

A variety of initiatives have been set into motion to address systemic food safety problems and foster comprehensive input to improve interagency collaboration. Since 1998, the FDA has sponsored 50-state workshops to bring together regulators and public health professionals from federal, state, local, and territorial agencies with extensive subject matter expertise in food, feed, epidemiology, laboratory science, veterinary science, environmental science, and public health.¹⁸⁵ The first 50-state workshop convened in 1998 but activities were suspended in 2001 due to political change and a redirection of national priorities.¹⁸⁶ Following a number of high-profile national outbreaks, and because President Obama declared food safety and protection a priority, these meetings were resurrected in 2008.

3. Partnership for Food Protection

A valuable outcome of the resuscitated 2008 50-state meeting was the creation of the Partnership for Food Protection (PFP), a working body of governmental collaboration established to implement recommendations from the workshops. Since its establishment, the PFP has utilized a workgroup structure to develop and implement procedures, best practices, and additional resources to assist in integration advancement. The PFP has been entrusted with fostering the creation and execution of an IFSS. Topics addressed by this group include managing conflict, integrating response efforts, conducting joint

¹⁸⁴ Government Accountability Office, *High Risk: Revamping Federal Oversight of Food Safety*.

¹⁸⁵ Partnership for Food Protection, *2012 50-State Workshop Summary Report* (Washington, DC: U.S. Food and Drug Administration, 2012), <http://www.fda.gov/downloads/ForFederalStateandLocalOfficials/FoodSafetySystem/UCM361293.pdf>.

¹⁸⁶ Partnership for Food Protection, *Partnership for Food Protection Newsletter* (Washington, DC: U.S. Food and Drug Administration, 2014), <http://www.fda.gov/downloads/ForFederalStateandLocalOfficials/FoodSafetySystem/PartnershipforFoodProtectionPFP/UCM406323.pdf>.

investigations, and improving communication.¹⁸⁷ The FDA considers the 50-state workshops as a key milestone in structuring an integrated national food safety system.

While the PFP has produced some best practices to enhance communication across governmental levels, this work is primarily targeted at Class 1 recall communication, such as ensuring that product information, distribution lists, and audit check assignments are shared expeditiously between the FDA and state agencies.¹⁸⁸ In 2012, the PFP response workgroup developed a *Quick Start Response Guide*, a visual tool to enhance rapid response communication and capabilities by food, epidemiology, and laboratory programs.

The 2012 PFP report provides information on some federal level work towards improvement. In September 2011, Commissioner Margaret Hamburg charged Mike Taylor, then Deputy Commissioner for Foods, and Deborah Autor, the Deputy Commissioner for Global Regulatory Operations and Policy, with establishing an administrative IFSS Task Force (ITF) to develop and implement new strategies and action plans to envelope state and local agencies into a full partnership.¹⁸⁹ This report includes recommendations, including the need for the FDA to build the operational infrastructure needed for a true IFSS:

The ITF needs to make information sharing between agencies more permanent by assessing existing information sharing mechanisms and addressing gaps. This requires reaching out to state leaders to engage in more information sharing and streamlining the process for efficiency.¹⁹⁰

Despite these advances, the communication needs of local agencies are often unaddressed or deferred, as illustrated by comments during a brainstorming session at the 2014 meeting:

¹⁸⁷ Partnership for Food Protection, *A United Approach to Public Health National Workshop Summary Report, August 17–19, 2010* (Washington, DC: U.S. Food and Drug Administration, 2010), <http://www.fda.gov/downloads/ForFederalStateandLocalOfficials/FoodSafetySystem/UCM361301.pdf>.

¹⁸⁸ Partnership for Food Protection, *Best Practices for Improving FDA and State Communication during Recalls, Summer 2015* (Washington, DC: U.S. Food and Drug Administration, 2015), <http://www.fda.gov/downloads/ForFederalStateandLocalOfficials/FoodSafetySystem/PartnershipforFoodProtectionPFP/UCM460013.pdf>.

¹⁸⁹ Partnership for Food Protection, *2012 50-State Workshop Summary Report*, 9.

¹⁹⁰ *Ibid.*, 10.

- Locals [need to be] viewed as a partner instead of being kicked to the curb
- Locals unaware of tools available
- Locals are underrepresented at PFP meetings
- No two-way model outbreak/recall communication protocols between federal, state, local and territorial health agencies¹⁹¹

Despite these issues, the PFP remains active, and improving outbreak investigation communication between federal, state, and local public health continues to be a work in progress.

P. OTHER FOOD PROTECTION COLLABORATION INITIATIVES

In 2011, the FDA entered into a five-year cooperative agreement with the National Center for Food Protection and Defense (NCFPD) to facilitate efforts to support critical federal-state collaboration. With an eye on the development of an IFSS, it was one of several projects funded by the FDA to create and launch collaborative online information-sharing tools aimed at a variety of stakeholder users.¹⁹²

The FDA, FSIS, and CDC continue to oversee a variety of initiatives to enhance interagency food safety coordination, such as the Interagency Food Safety Analytics Collaboration (IFSAC), which is designed to estimate foodborne illness source attribution better. However, as pointed out by the GAO, none of these initiatives currently touch on all desired aspects of centralized collaboration among federal agencies.¹⁹³

The Integrated Foodborne Outbreak Response and Management (InFORM) conference is a series of meetings held every two years since 2013, with the intent of integrating separate educational events for the different disciplines and agencies intimately involved in foodborne outbreak detection and response. Previously, the CDC and the APHL sponsored PulseNet meetings for laboratory staff who were part of their

¹⁹¹ Author's notes from 50-State Workshop, Mutual Reliance for a Safer Food Supply, St. Louis, 2014.

¹⁹² U.S. Department of Homeland Security, U.S. Food and Drug Administration, and U.S. Department of Agriculture, *2011 Sector Critical Infrastructure Protection Annual Report for the Food and Agriculture Sector*, 10.

¹⁹³ U.S. Government Accountability Office, *High Risk: Revamping Federal Oversight of Food Safety*.

national networks. Similarly, OutbreakNet meetings for epidemiology staff were sponsored by the CDC or APHL. InFORM 2013 served to integrate the PulseNet and OutbreakNet meetings, and expanded to include EH specialists involved in outbreak response. Sponsored by the CDC, APHL, USDA/FSIS, and FDA, this combined meeting serves to support the vision of an IFSS by expanding and enhancing partnerships among and between disciplines, with the intent of integrating and amplifying multi-agency and multi-disciplinary responses.

As illustrated in this chapter, effective communication is an essential element within and between agencies to prevent and respond to widespread illness attributed to food. Agencies at the federal, state, and local levels, as well as a number of non-governmental organizations, are working toward new enhancements, and assuring coordinated communication and response efforts. Further efforts need to include the development of realistic protocols or specific remedies to reduce communication vulnerabilities, as well as establish realistic solutions to enhance governmental capabilities for effective communication in all directions, laterally, upward, downward, within, and between agencies.

III. RESEARCH ANALYSIS AND FINDINGS

Many states have protocols or guidelines to provide steps for staff to follow in foodborne outbreak response. This chapter examines states' general operating procedures to ascertain lines and modes of communication related to foodborne outbreaks, determine procedural commonalities, identify potential barriers, and make recommendations to enhance multi-directional information exchanges between health agencies.

A. COMMON THEMES: OPTIMIZING INTER- AND INTRA- AGENCY OUTBREAK COMMUNICATIONS

A strong and flexible public health infrastructure is the best defense against any disease outbreak—naturally or intentionally caused. As with all public health events, coordination and cooperation among all agencies are critical to the success of any response.

~ Centers for Disease Control and Prevention¹⁹⁴

To assure a streamlined approach to foodborne outbreak response, many states have created protocol documents instructing their agencies on acceptable response actions (see Table 3). A protocol is “a standardized way of performing a task in a process that is repeatable and reproducible.”¹⁹⁵ It has the advantage of enabling actions to be undertaken in a homogenous pattern. Although generically called protocols, the foodborne outbreak response documents reviewed are more like SOGs, or standard operating guidelines, checklists, or best practices. As situations and resources may vary, each state or agency has customized the guidelines to fit their particular political and structural circumstances.

The state and agency foodborne outbreak response documents used in this study were examined to ascertain defined practices for coordinated information management.

¹⁹⁴ U.S. Centers for Disease Control and Prevention, *Public Health Emergency Response: The CDC Role* (Atlanta, GA: U.S. Centers for Disease Control and Prevention, 2001), http://www.bt.cdc.gov/DocumentsAPP/Improving_biodefense.pdf.

¹⁹⁵ European Association of Nuclear Medicine, *Working with Protocols* (Vienna, Austria: European Association of Nuclear Medicine, 2003), http://www.eanm.org/committees/technologist/tech_write_protocols.pdf.

In other words, they were reviewed to ascertain timely sharing of pertinent critical information during outbreak response. Response is based on public health core principles of preventing disease and death. The North Carolina Institute for Public Health outlined a series of questions to envisage as an outbreak unfolds, including:

- What resources, including personnel are available?
- Who will direct the day-to-day investigation?
- How will the team communicate with each other?
- How will data be shared and analyzed?
- Who will write the final report and present the information?¹⁹⁶

The processes described within a protocol document should be clear and logical to ensure understanding and appropriate implementation.¹⁹⁷ It is recognized that standard operating guidelines may have varying specific features, based on the lens of the parent organization. Regardless, to be most efficacious, procedure manuals that are clear, easy to follow, and formatted well are those that are the most likely to be consistently utilized. When it comes to communication and information sharing during an outbreak, it is essential to keep in mind who needs to know what, when, how this information will be transferred, and by whom. Namely, who owns and is accountable for communication in responses?

Numerous foodborne outbreak response guidelines have been developed by federal, state, and local governmental and nongovernmental agencies, as well as by national professional organizations, many of which are referenced throughout this document. These guidelines vary in scope, and although the recommendations all have similar concepts on communication improvement, they do not always align with one another across agencies or jurisdictions, nor have they been universally adopted by state, county, or local jurisdictions. Three model documents, recognized as the main guidance

¹⁹⁶ North Carolina Center for Public Health Preparedness, *Focus on Field Epidemiology* (Chapel Hill, NC: North Carolina Center for Public Health Preparedness 2003), http://nciph.sph.unc.edu/focus/vol11/issue2/1-2Team_issue.pdf.

¹⁹⁷ Kristie Lorette, “The Guidelines on Writing Procedure Manuals, *Houston Chronicle*, accessed November 18, 2015, <http://smallbusiness.chron.com/guidelines-writing-procedure-manuals-3121.html>.

references in the United States, were primarily used to ascertain if the content in states' protocols met with best practices in communication. These three documents are the following:

- Council to Improve Foodborne Outbreak Response (CIFOR): *Guidelines for Foodborne Disease Outbreak Response* (2009)¹⁹⁸
- International Association for Food Protection: *Procedures to Investigate Foodborne Illness*, 6th ed. (2011)¹⁹⁹
- National Food Safety System Project: *Multistate Foodborne Outbreak Investigations Guidelines for Improving Coordination and Communication* (2001)²⁰⁰

With these guidance documents, this study sought to identify documented routes of internal and external agency communications and information sharing during foodborne outbreak response in the states. No “one-size-fits-all” exists when it comes to outbreak communications. However, commonalities and standard frameworks can help assure core principles are met and communication barriers are identified and addressed. The following information provides a behind-the-scenes look at what might or not occur—during outbreak investigations and responses. Further, this chapter looks to provide a detailed discussion of strategies used by states for information exchange and identify promising systemic improvements.

Limitation of document:

- State protocols were open-source, and obtained online. States were contacted via email to verify the outbreak protocol posted online was the most current version.
- Some states did not respond to the inquiry email, so it was presumed the document posted was currently in use.

¹⁹⁸ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*.

¹⁹⁹ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*.

²⁰⁰ National Food Safety System Project, *Multistate Foodborne Outbreak Investigations Guidelines for Improving Coordination and Communication* (Washington, DC: U.S. Food and Drug Administration, 2001), <http://www.fda.gov/downloads/ForFederalStateandLocalOfficials/FoodSafetySystem/UCM143338.pdf>.

- All the agency protocols reviewed included various processes for outbreak investigations. However, this research concentrates on steps or guidance on aspects related to communication; that is, obtaining and sharing information within and across stakeholder regulatory agencies.
- Arizona and Iowa’s protocols include a preceptive note that is likely applicable to the other documents reviewed, “This resource manual is not intended to replace existing procedure manuals. Instead, it should be used as a reference document for comparison with existing procedures, for filling in gaps and updating agency-specific procedures, for creating new procedures where they do not exist, and training staff.”²⁰¹
- It is interesting to note that, although there are procedural and scientific commonalities, the states’ procedures also vary widely, especially in the areas of outreach and communication sharing.
- Many states do not reference the *CIFOR Guidelines*, arguably the standard model for outbreak response in the United States.
- Maricopa County, the only protocol in this study not from a state agency, was attached as an appendix to Arizona’s document. Due to its potential value in providing a local agency perspective, it was included in this study.
- Throughout this chapter, the term “states” includes both states and Maricopa County.
- Protocols for waterborne gastrointestinal outbreaks were not included in this study, as attributed illnesses could also occur from recreational exposures, such as swimming.
- Some outbreak response protocols, such as Florida, Massachusetts, and New Jersey, are part of a larger document that covers responses for food and non-food related outbreaks. For the purposes of this study, only the section related to foodborne diseases was considered.

²⁰¹ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual* (Phoenix, AZ: Arizona Department of Health Services, 2010), <http://www.azdhs.gov/documents/preparedness/epidemiology-disease-control/disease-investigation-resources/foodborne-waterborne-disease-outbreak-manual.pdf>; Iowa Department of Public Health, *IDPH Foodborne Outbreak Investigation Manual* (Des Moines, IA: Iowa Department of Public Health, 2014), http://www.idph.state.ia.us/idph_universalhelp/main.aspx?system=IdphFoodborneDiseaseManual.

Table 3. List of States and their Foodborne Outbreaks Protocol Documents

State	Document Name / Web Location	Year	FDA Food Code Version Adopted ²⁰⁶	Pages
Alabama	Foodborne Outbreaks Protocols ²⁰⁷ , http://www.adph.org/epi/assets/FBO_Protocols.pdf	2012	2005	5 pages
Arizona	Foodborne and Waterborne Disease Outbreak Investigation Resource Manual ²⁰⁸ http://www.azdhs.gov/phs/oids/pdf/manuals/AZOutbreakManual.pdf	2010	1999	208 pages
Florida	Chapter G: Food and Waterborne Disease Surveillance and Investigation ²⁰⁹ http://www.floridahealth.gov/diseases-and-conditions/food-and-waterborne-disease/_documents/2005.pdf	2014	2009	11 pages
Iowa	IDPH Foodborne Outbreak Investigation Manual ²¹⁰ http://www.idph.state.ia.us/idph_universalhelp/main.aspx?system=IdphFoodborneDiseaseManual	2006	2009	86 pages
Kansas	Foodborne Illness and Outbreak Investigation Manual ²¹¹ http://www.kdheks.gov/epi/download/kansas_foodborne_illness_manual.pdf	2008	2009	186 pages

²⁰⁶ Association of Food and Drug Officials (AFDO), *Real Progress in Food Code Adoption* (Washington, DC: U.S. Food and Drug Administration, 2001), <http://www.fda.gov/downloads/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/UCM476819.pdf>.

²⁰⁷ Alabama Department of Public Health, *Foodborne Outbreaks Protocols* (Linden, AL: Alabama Department of Public Health, 2012), http://www.adph.org/epi/assets/FBO_Protocols.pdf.

²⁰⁸ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

²⁰⁹ Florida Department of Health, *Food and Waterborne Disease Surveillance and Investigation* (Tallahassee, FL: Florida Department of Health, 2005), http://www.floridahealth.gov/diseases-and-conditions/food-and-waterborne-disease/_documents/2005.pdf.

²¹⁰ Iowa Department of Public Health, *IDPH Foodborne Outbreak Investigation Manual*.

²¹¹ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual* (Topeka, KS: Kansas Department of Health and Environment, 2008), http://www.kdheks.gov/epi/download/kansas_foodborne_illness_manual.pdf.

Table 3. List of States and their Foodborne Outbreaks Protocol Documents (Continued)

State	Document Name / Web Location	Year	FDA Food Code Version Adopted ²¹²	Pages
Kentucky	Foodborne and Waterborne Outbreak Investigation Manual, Version 2 ²¹³ http://chfs.ky.gov/dph/epi/Outbreak_Manual.htm	2013	2005	205 pages
Louisiana	Food-borne Outbreak Investigation ²¹⁴ http://www.dhh.louisiana.gov/assets/oph/Center-PHCH/Center-CH/infectious-epi/EpiManual/FoodOutbreakManual.pdf	2012	1999	16 pages
Maricopa County, AZ	The Foodborne and Waterborne Illness Outbreak Investigation Guide “The FWBI Cookbook” ²¹⁵ http://www.azdhs.gov/phs/oids/pdf/manuals/AZOutbreakManual.pdf	2007	1999	19 pages
Massachusetts	Foodborne Illness Complaint / Outbreak Actions ²¹⁶ http://www.mass.gov/eohhs/gov/local-gov/foodbourne-illness/foodborne-illness-investigations-and-control.html	1997	1999	12 pages

²¹² Association of Food and Drug Officials (AFDO), *Real Progress in Food Code Adoption* (Washington, DC: U.S. Food and Drug Administration, 2001), <http://www.fda.gov/downloads/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/UCM476819.pdf>.

²¹³ Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual, Version 2* (Frankfort, KY: Kentucky Cabinet for Health and Family Services, 2013), <http://chfs.ky.gov/NR/rdonlyres/73FA3399-9DFD-44F1-B667-A98BB97F0A70/0/FoodborneandWaterborneOutbreakInvManualFinal314.pdf>.

²¹⁴ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation* (Baton Rouge, LA: Louisiana Department of Health and Hospitals, 2012), <http://www.dhh.louisiana.gov/assets/oph/Center-PHCH/Center-CH/infectious-epi/EpiManual/FoodOutbreakManual.pdf>.

²¹⁵ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

²¹⁶ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint/Outbreak Actions* (Boston, MA: Massachusetts Department of Health and Human Services, 1997), <http://www.mass.gov/eohhs/docs/dph/environmental/foodsafety/ref-manual/intro-pages.pdf>.

Table 3. List of States and their Foodborne Outbreaks Protocol Documents (Continued)

State	Document Name / Web Location	Year	FDA Food Code Version Adopted ²¹⁷	Pages
Minnesota	Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota ²¹⁸ http://www.health.state.mn.us/divs/eh/food/pwdu/fboprotocol041609.pdf	2009	1997	38 pages
Missouri	Communicable Disease Investigation Reference Manual ²¹⁹ http://health.mo.gov/living/healthcondiseases/communicable/communicabledisease/cdmanual/pdf/CDsec30.pdf	2012	2009	65 pages
New Jersey	Communicable Disease Outbreak Manual: New Jersey's Public Health Response ²²⁰ http://njlmn2.rutgers.edu/sites/default/files/NJACCHO%20Outbreak%20Investigation%20Manual_0.pdf	2013	2001	58 pages
North Carolina	North Carolina's Foodborne Illness Investigation Guidance and Tools ²²¹ http://ehs.ncpublichealth.com/faf/food/fd/docs/GuidelinesforEnvironmentalFieldInvestigations-August%202012.pdf	2005	2009	7 pages

²¹⁷ Association of Food and Drug Officials (AFDO), *Real Progress in Food Code Adoption* (Washington, DC: U.S. Food and Drug Administration, 2001), <http://www.fda.gov/downloads/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/UCM476819.pdf>.

²¹⁸ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota* (Saint Cloud, MN: Minnesota Department of Health, 2009), <http://www.health.state.mn.us/divs/eh/food/pwdu/fboprotocol041609.pdf>.

²¹⁹ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual* (Jefferson City, MO: Missouri Department of Health and Senior Services, 2003), <http://health.mo.gov/living/healthcondiseases/communicable/communicabledisease/cdmanual/pdf/CDsec30.pdf>.

²²⁰ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual: New Jersey's Public Health Response* (New Brunswick, NJ: New Jersey Association of County and City Health Officials, New Jersey Department of Health and Rutgers, The State University of New Jersey, NJAES, Office of Continuing Professional Education, 2013), http://njlmn2.rutgers.edu/sites/default/files/NJACCHO%20Outbreak%20Investigation%20Manual_0.pdf.

²²¹ North Carolina Department of Health and Human Services, *North Carolina's Foodborne Illness Investigation Guidance and Tools* (Raleigh, NC: North Carolina Department of Health and Human Services, 2012), <http://ehs.ncpublichealth.com/faf/food/fd/docs/GuidelinesforEnvironmentalFieldInvestigations-August%202012.pdf>.

Table 3. List of States and their Foodborne Outbreaks Protocol Documents (Continued)

State	Document Name / Web Location	Year	FDA Food Code Version Adopted ²²²	Pages
North Dakota	Foodborne Outbreak Investigation Manual ²²³ http://www.ndhealth.gov/disease/GI/Docs/FoodBorneManual_FINAL.pdf	2012	2009	48 pages
Ohio	Foodborne Disease Outbreaks ²²⁴ http://www.odh.ohio.gov/pdf/idcm/fdbrn.pdf	2011	2009	15 pages
Rhode Island	Guidelines for Investigating Foodborne Illness Outbreaks ²²⁵ http://www.health.ri.gov/publications/guidelines/InvestigatingFoodborneIllnessOutbreaks.pdf	2007	2005	94 pages
Texas	Foodborne Disease Outbreak Manual ²²⁶ http://www.dshs.state.tx.us%2Fidcu%2Fhealth%2Ffoodborne_illness%2Finvestigation%2Ffbidoc.pdf&ei=NRaqUouHBoS3sATCj4GQCw&usg=AFQjCNErYIi4wZSyO5_G6GHZis3MgUx5w&sig2=JjWWtlyJO9A_TqY0kgW8bQ&bvm=bv.57967247,d.cWc&cad=rja	1999	2001	31 pages

²²² Association of Food and Drug Officials (AFDO), *Real Progress in Food Code Adoption* (Washington, DC: U.S. Food and Drug Administration, 2001), <http://www.fda.gov/downloads/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/UCM476819.pdf>.

²²³ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual* (Bismarck, ND: North Dakota Department of Health, 2012), http://www.ndhealth.gov/disease/GI/Docs/FoodBorneManual_FINAL.pdf.

²²⁴ Ohio Department of Health, *Foodborne Disease Outbreaks* (Columbus, OH: Ohio Department of Health, 2014), <http://www.odh.ohio.gov/pdf/idcm/fdbrn.pdf>.

²²⁵ State of Rhode Island Department of Health, *Guidelines for Investigating Foodborne Illness Outbreaks* (Providence, RI: State of Rhode Island Department of Health, 2004), <http://www.health.ri.gov/publications/guidelines/InvestigatingFoodborneIllnessOutbreaks.pdf>.

²²⁶ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual* (Austin, TX: Texas Department of State Health Services, 1999), https://www.dshs.state.tx.us/idcu/health/foodborne_illness/investigation/. Note that the *Foodborne Disease Outbreak Manual* is currently under review.

Table 3. List of States and their Foodborne Outbreaks Protocol Documents (Continued)

State	Document Name / Web Location	Year	FDA Food Code Version Adopted ²²⁷	Pages
Utah Department of Health, Bureau of Epidemiology	Foodborne Outbreak Investigation Guidelines ²²⁸ http://health.utah.gov/envsvc/ESP/FoodSafetyProgram/outbreak.pdf	1998	2009	3 pages
Virginia	Foodborne Outbreaks ²²⁹ http://www.vdh.virginia.gov/EnvironmentalHealth/FOOD/FoodSafety/GuidanceDocs/GuidanceFiles/Inspxn%20processes/VDH%20Disease%20Control%20Manual.pdf	1999	2005	7 pages
Washington	Foodborne Disease Outbreaks ²³⁰ http://www.doh.wa.gov/Portals/1/Documents/5100/420-054-Guideline-FoodOutbreak.pdf	2012	1999	10 pages
West Virginia	General Outbreak Investigation / Notification Protocol ²³¹ http://www.dhhr.wv.gov/oeps/disease/ob/Documents/Outbreak%20Investigation%20protocol.pdf	2008	2005	11 pages
Wisconsin	Foodborne and Waterborne Disease Outbreak Investigation Manual ²³² https://www.dhs.wisconsin.gov/foodborne/fd-wtr-borne-man.pdf	2008	2009	114 pages

²²⁷ Association of Food and Drug Officials (AFDO), *Real Progress in Food Code Adoption* (Washington, DC: U.S. Food and Drug Administration, 2001), <http://www.fda.gov/downloads/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/UCM476819.pdf>.

²²⁸ Utah Department of Health, *Foodborne Outbreak Investigation Guidelines* (Salt Lake City, UT: Utah Department of Health, 1998), <http://health.utah.gov/envsvc/ESP/FoodSafetyProgram/outbreak.pdf>.

²²⁹ Virginia Department of Health, *Foodborne Outbreaks* (Richmond, VA: Virginia Department of Health, 1999), <http://www.vdh.virginia.gov/EnvironmentalHealth/FOOD/FoodSafety/GuidanceDocs/GuidanceFiles/Inspxn%20processes/VDH%20Disease%20Control%20Manual.pdf>.

²³⁰ Washington State Department of Health, *Foodborne Disease Outbreaks* (Tumwater, WA: Washington State Department of Health, 2013), <http://www.doh.wa.gov/Portals/1/Documents/5100/420-054-Guideline-FoodOutbreak.pdf>.

²³¹ West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol* (Charleston, WV: West Virginia Department of Health and Human Resources, 2008), <http://www.dhhr.wv.gov/oeps/disease/ob/Documents/Outbreak%20Investigation%20protocol.pdf>.

²³² Wisconsin Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Manual* (Madison, WI: Wisconsin Department of Health Services, 2008), <https://www.dhs.wisconsin.gov/foodborne/fd-wtr-borne-man.pdf>.

B. STATE PROTOCOL DOCUMENTS

Not surprisingly, most of the state's documents had similar titles, as they are all intended for a particular focus, the investigation of, and response to, multiple cases of illness attributed to food. The titling of the documents were all shades of the same basic definition, and incorporated one of the following terms: manual, protocols, guide/guidance/guidelines, tools, actions, and reference. One outbreak response instrument—Maricopa County—had an additional user-friendly subtitle, *The Food and Waterborne Illness Cookbook*. Four states, Florida, Missouri, New Jersey, and West Virginia, incorporated foodborne outbreak response as a section or chapter in a larger communicable disease outbreak manual. Two states specifically indicated their protocols were a collaborative document. New Jersey partnered with the New Jersey Association of County and City Health Officials (NJACCHO), and Virginia's document was a partnership between the Virginia Department of Health and the Virginia Department of Agriculture and Consumer Services. Only one manual had a communication reference in the title. West Virginia named its guidelines, *General Outbreak Investigation/Notification Protocol*.²³³

The length of the documents reviewed ranged from three pages to 208 pages, with the larger dossiers being more detailed, and the shorter documents being older. The date range for the creation of or updates to the protocols ranged from as early as 1997 (Massachusetts), to as recent as 2014 (New Jersey). Some are reviewed or updated annually; others have no timeframe for appraisal or revisions. While most protocols were procedural for food-related complaints and outbreaks regardless of source attribution, Minnesota had the only document with a title specific to foodborne outbreaks in foodservice establishments (*Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*).²³⁴

²³³ West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol*.

²³⁴ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*.

The terms “foodborne disease” and “foodborne illness” were used interchangeably in the documents, but some states were broader in their outbreak source inclusion. The majority of the protocols were targeted towards illness from food; however, Arizona, Florida, Kentucky, Maricopa County, and Wisconsin incorporated waterborne diseases along with food. For the purposes of this research, only the foodborne outbreak sections of protocols were reviewed, as waterborne gastrointestinal illnesses can be also be contracted from recreational activities and other non-food related sources.

1. Target Audience

While the documents reviewed were targeted toward regulatory outbreak response within an agency, a wide range of professional expertise is represented throughout the roles and responsibilities set forth by the sponsoring authorities. Given the variety of agencies involved, and their respective centralized or decentralized structure, a particular state and its local public health agencies may fall under the same or differing procedural documents, depending on the state’s structure. “Staff” is a generic term that can be attributed to a wide range of personnel conducting a variety of investigative and clerical tasks. These tasks and the responsible professionals can differ based on agency structure, state professional licensing requirements, position pre-requisites, and the availability of funding and resources. Overall, it can be interpreted that the documents are targeted towards the professionals in public health agencies who have a participatory role in surveillance for and response to foodborne outbreaks.

2. Stated Communication Goals and Objectives

For effective outbreak response, the multi-directional exchange of information and coordination of response efforts is a required element for vigilance in foodborne and enteric disease tracking and investigation, especially when a number of agencies are involved.²³⁵ With this in mind, this study sought to identify which protocols, if any, have specific, measurable goals to assure the timely and appropriate sharing of essential

²³⁵ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 5.

outbreak investigation information to those stakeholders who have a need to be informed. Communication goals and objectives foster an agency's ability to maintain focus and perspective, and establish communication priorities when faced with a foodborne outbreak.

To encompass the nuances of communication and how the application of communication principles could be interpreted, the following terms, found in the protocols, were considered to be synonymous with communication: advise, brief, call, collaborate, collaboration, communicate, consult, contact, cooperate, coordinate, discuss, forward, exchange information, inform, liaise, negotiate, reach out, report, share, update, and work together.

As one of many components of outbreak investigation and response, most states did not specify separate goals and objectives for outbreak communication. Rather, stated purposes of the documents tended to address the entire scope of outbreak response. Arizona said it thusly, "This manual is intended to provide a structure for coordinating the activities of the various public health, laboratory and administrative agencies responsible for the investigation, prevention, and control of food and waterborne disease."²³⁶ While communication is inherent in the overarching business of outbreak response, it is such an essential component that it could be argued the element of assuring effective information exchange should be an objective of outbreak response, if not an outright goal.

Of the states that addressed communication principles, Missouri phrased it most succinctly, "Communicate often, early, and accurately."²³⁷ Florida similarly stated, "During any food disease outbreak or complaint investigation, prompt communications are of the utmost importance."²³⁸

²³⁶ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 8.

²³⁷ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*.

²³⁸ Florida Department of Health, *Food and Waterborne Disease Surveillance and Investigation*.

Of all the protocols reviewed, New Jersey's document was the only one that explicitly defined performance goals for outbreak tracking and response, inclusive of communications. Targeted at local health departments, these communication goals include the expectation that local health jurisdictions will immediately report all suspected outbreaks to the state department of health, forward all investigation summary reports to the state department of health within 30 days of investigation completion, update the contact listings red book within 24 hours of a change in personnel or contact information, and ensure that contact information is always 24/7 and 3x3 (three contact persons with three contact methods.) While a valuable set of goals, it falls short by not including performance expectations for other stakeholders or specifying bi-directional communication and information exchange.

Minnesota has a slightly different tone. Its protocol does not stipulate a goal verbatim, but rather designates a focus for its foodborne outbreak response plan, "This document articulates mechanisms for communicating and sharing responsibilities."²³⁹ It goes on to particularize, "It is essential that the individuals identified (e.g., key staff) communicate frequently to exchange information throughout the outbreak investigation."²⁴⁰

While it is accurate to categorize that the documents audited for this study did not include communication goals stated as such, they all had aspects that could be viewed as information exchange targets. For instance, Louisiana specified, "when a potential outbreak situation occurs, the first person involved should ensure that all the stakeholders are informed."²⁴¹ Similarly, Massachusetts looks to assure that "coordination and communication with other members of the foodborne illness complaint response team is imperative. Additionally, be sure to keep others not directly involved in an outbreak

²³⁹ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*.

²⁴⁰ Ibid.

²⁴¹ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*.

informed.”²⁴² Kansas included communication as the second step in conducting an outbreak investigation by stipulating “contact and coordinate with key personnel.”²⁴³

Iowa recognized the breadth of partners that may be involved in an outbreak, and the need to assure regular contact and updates, “Due to the number of partners that may be involved in a foodborne outbreak investigation, ongoing communication is critical to keep everyone informed and organized.”²⁴⁴ In its steps to conduct an investigation, Kansas reminds its professionals to “contact and coordinate with key personnel”²⁴⁵ because “coordination and cooperation among all agencies are critical to the success of any response.”²⁴⁶ In review of the documents, “coordinate” and “cooperate” were two terms used widely. Perhaps adding the concept of two-way information exchange would make this common phrase more accurate and applicable. The goal, simply stated could be: coordinate, cooperate, and communicate.

The need for open communication by all members of the outbreak team is emphasized throughout the manuals of Minnesota and Kentucky:

Successful investigation and resolution of an outbreak depends on the communication and collaboration of a multi-disciplinary team. How will communications occur and are contact information sheets and clear directions available? Answers to these types of questions will be crucial to successful investigation. Successful investigation and resolution of an outbreak depends on the communication and collaboration of a multi-disciplinary team.²⁴⁷

An optimal plan should also include communication goals that address the distribution of information to stakeholders outside the core state regime for situational

²⁴² Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint/Outbreak Actions*.

²⁴³ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*.

²⁴⁴ Iowa Department of Public Health, *IDPH Foodborne Outbreak Investigation Manual*.

²⁴⁵ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*.

²⁴⁶ Ibid.

²⁴⁷ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*; Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual, Version 2*.

surveillance, response, and recovery. As Texas included in its document, be sure to “Inform other agencies of the possible outbreak, so that they are aware of the problem, and can report cases of similar illness to your agency rapidly.”²⁴⁸ Lastly, North Dakota specified its communication “goal” in terms of aligning messages, “Coordinate as necessary with state and local public information officers to coordinate the distribution of news releases, health alerts, conference calls and memos.”²⁴⁹

3. Defining a Foodborne Outbreak

There are nuances in the specific terms states use to refer to an outbreak related to food consumption, such as:

- “Outbreak” (ND,²⁵⁰ WV²⁵¹)
- “Foodborne outbreak” (AZ,²⁵² RI,²⁵³)
- “Foodborne illness” (AL)²⁵⁴
- “Common source foodborne illness” (FL)²⁵⁵
- “Outbreak of foodborne illness” (NJ)²⁵⁶
- “Confirmed foodborne disease” (LA)²⁵⁷
- “Potential foodborne outbreak” (MO)²⁵⁸

²⁴⁸ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*.

²⁴⁹ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*.

²⁵⁰ Ibid.

²⁵¹ West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol*, 1.

²⁵² Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 19.

²⁵³ State of Rhode Island Department of Health, *Guidelines for Investigating Foodborne Illness Outbreaks*, 10.

²⁵⁴ Alabama Department of Public Health, *Foodborne Outbreaks Protocols*, 1.

²⁵⁵ Florida Department of Health, *Food and Waterborne Disease Surveillance and Investigation*.

²⁵⁶ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*, 6.

²⁵⁷ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*, 1.

²⁵⁸ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*.

- “Foodborne disease outbreak” (MA,²⁵⁹ MN,²⁶⁰ UT²⁶¹)
- “Suspected foodborne disease outbreak” (KS,²⁶² WA²⁶³)

Despite the subtleties in the terms, the prevalent meaning is clear, people became ill from eating food.

The CDC defines a foodborne-disease outbreak (FBDO) as “an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food.”²⁶⁴ The FDA echoes this description. Definitions from other references common to health departments extrapolate this concept to include the process of professional analysis. The CIFOR defines a foodborne outbreak as “two or more cases of a similar illness shown by an investigation to result from a common exposure, such as the ingestion of a common food.”²⁶⁵ The CSTE adds an additional element to its definition, “An incident in which two or more persons experience a similar illness after ingestion of a common food, and epidemiologic analysis implicates the food as the source of the illness.”²⁶⁶

It might be expected that states would adopt one of the definitions originating from oversight agencies or from professional organizations, but a number have reworded or extrapolated on the federal definition. A few definitions refer to any type of outbreak, but most are directly related to food ingestion:

²⁵⁹ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint / Outbreak Actions*, 8.

²⁶⁰ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*, 9.

²⁶¹ Utah Department of Health, *Foodborne Outbreak Investigation Guidelines*, 1.

²⁶² Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*, 13.

²⁶³ Washington State Department of Health, *Foodborne Disease Outbreaks*, 4.

²⁶⁴ According to the CDC, before 1992, three exceptions existed to this definition; only one case of botulism, marine-toxin intoxication, or chemical intoxication was required to constitute a foodborne disease outbreak if the etiology was confirmed. The definition was changed in 1992 to require two or more cases to constitute an outbreak.

²⁶⁵ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 249.

²⁶⁶ “Foodborne Disease Outbreak 2011 Case Definition,” accessed June 3, 2015, <http://wwwn.cdc.gov/nndss/conditions/foodborne-disease-outbreak/case-definition/2011/>.

- “Foodborne illnesses refer to diseases acquired through eating or drinking contaminated foods or liquids” (AL)²⁶⁷
- “An outbreak is an unexpected, unexplained increase of disease occurring within a specific population at a given time and place” (AL)²⁶⁸
- “An unexpected, unexplained increase of a similar illness, and food is a likely source” (AL)²⁶⁹
- “If there are two or more foodborne illness complaints from the same facility within a 14-day time period OR two or more individuals became ill after consuming food from a common source AND they reside in at least two households” (AL)²⁷⁰
- “An outbreak or an epidemic is the occurrence in a community or region of an illness(es) similar in nature, clearly in excess of normal expectancy and derived from a common or propagated source” (ND)²⁷¹

How do the state protocols in this study define a foodborne outbreak? Most agree that a foodborne outbreak consists of two or more persons, experiencing a similar illness after ingesting a common food. Further refining this definition, Alabama, Virginia, and Missouri specify affected persons need to be from different households, while Kansas looks for ill persons to be unrelated. Several states broaden the concept of common food. Louisiana includes a common meal as acceptable, while New Jersey and Washington focus on different foods from a common source. North Dakota incorporates the ingestion of food from a common place or common or propagated source, while Massachusetts includes exposure to the same food source, and Arizona persons with the same exposure. Rounding out the list, Missouri and Minnesota also include the consumption of a common beverage in their foodborne outbreak definition.

²⁶⁷ Alabama Department of Public Health, *Foodborne Outbreaks Protocols*, 1.

²⁶⁸ Ibid.

²⁶⁹ Ibid.

²⁷⁰ Ibid.

²⁷¹ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*, 4.

- “Two or more persons” (AL,²⁷² AZ,²⁷³ IA,²⁷⁴ KS,²⁷⁵ KY,²⁷⁶ LA,²⁷⁷ MA,²⁷⁸ Maricopa County,²⁷⁹ MO,²⁸⁰ MN,²⁸¹ NC,²⁸² NJ,²⁸³ OH,²⁸⁴ RI,²⁸⁵ TX,²⁸⁶ UT,²⁸⁷ VA,²⁸⁸ WA,²⁸⁹ WI,²⁹⁰ WV²⁹¹)
- “From different households” (AL,²⁹² MO,²⁹³ VA²⁹⁴)

²⁷² Alabama Department of Public Health, *Foodborne Outbreaks Protocols*,

²⁷³ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 19.

²⁷⁴ Iowa Department of Public Health, *IDPH Foodborne Outbreak Investigation Manual*, 19.

²⁷⁵ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*, 13.

²⁷⁶ Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual*, 8.

²⁷⁷ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*, 1.

²⁷⁸ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint/Outbreak Actions*, 8.

²⁷⁹ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 19.

²⁸⁰ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*, 13.

²⁸¹ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*, 9.

²⁸² North Carolina Department of Health and Human Services, *North Carolina’s Foodborne Illness Investigation Guidance and Tools*, 1.

²⁸³ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*, 6.

²⁸⁴ Ohio Department of Health, *Foodborne Disease Outbreaks*, 2.

²⁸⁵ State of Rhode Island Department of Health, *Guidelines for Investigating Foodborne Illness Outbreaks*, 10.

²⁸⁶ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*, 1.

²⁸⁷ Utah Department of Health, *Foodborne Outbreak Investigation Guidelines*, 1.

²⁸⁸ Virginia Department of Health, *Foodborne Outbreaks*, 1.

²⁸⁹ Washington State Department of Health, *Foodborne Disease Outbreaks*, 4.

²⁹⁰ Wisconsin Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Manual*, 2.

²⁹¹ West Virginia Department of Health and Human Resources, *General Outbreak Investigation / Notification Protocol*, 1.

²⁹² Alabama Department of Public Health, *Foodborne Outbreaks Protocols*.

²⁹³ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*.

²⁹⁴ Virginia Department of Health, *Foodborne Outbreaks*, 1.

- “Unrelated” (KS²⁹⁵)
- “Experiencing a similar illness” (AL,²⁹⁶ KY,²⁹⁷ LA,²⁹⁸ MA,²⁹⁹ Maricopa County,³⁰⁰ MO,³⁰¹ MN,³⁰² NC,³⁰³ ND,³⁰⁴ NJ,³⁰⁵ OH,³⁰⁶ RI,³⁰⁷ TX,³⁰⁸ UT,³⁰⁹ VA,³¹⁰ WA,³¹¹ WV³¹²)
- “Same disease” (AZ³¹³)
- “Similar objective symptoms” (KS³¹⁴)

²⁹⁵ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*, 13.

²⁹⁶ Alabama Department of Public Health, *Foodborne Outbreaks Protocols*.

²⁹⁷ Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual, Version 2*, 8.

²⁹⁸ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*, 1.

²⁹⁹ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint / Outbreak Actions*, 8.

³⁰⁰ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

³⁰¹ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*, 13.

³⁰² Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*, 9.

³⁰³ North Carolina Department of Health and Human Services, *North Carolina’s Foodborne Illness Investigation Guidance and Tools*, 1.

³⁰⁴ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*, 4.

³⁰⁵ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

³⁰⁶ Ohio Department of Health, *Foodborne Disease Outbreaks*, 2.

³⁰⁷ State of Rhode Island Department of Health, *Guidelines for Investigating Foodborne Illness Outbreaks*, 10.

³⁰⁸ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*, 1.

³⁰⁹ Utah Department of Health, *Foodborne Outbreak Investigation Guidelines*, 1.

³¹⁰ Virginia Department of Health, *Foodborne Outbreaks*, 1.

³¹¹ Washington State Department of Health, *Foodborne Disease Outbreaks*, 4.

³¹² West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol*, 1.

³¹³ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

³¹⁴ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*.

- “After ingestion of a common food” (KY,³¹⁵ LA,³¹⁶ Maricopa County,³¹⁷ MO,³¹⁸ MN,³¹⁹ NC,³²⁰ NJ,³²¹ OH,³²² RI,³²³ TX,³²⁴ UT,³²⁵ VA,³²⁶ WA,³²⁷ WV³²⁸)
- “Or meal” (LA³²⁹)
- “From a common or propagated source” (ND³³⁰)
- “Common place” (ND³³¹)
- “Different foods from a common place” (KY,³³² NJ,³³³ WA³³⁴)

³¹⁵ Kentucky Cabinet for Health and Family Services, “Foodborne and Waterborne Outbreak Investigation Manual, Version 2.”

³¹⁶ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*.

³¹⁷ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

³¹⁸ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*, 8.

³¹⁹ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*, 9.

³²⁰ North Carolina Department of Health and Human Services, *North Carolina’s Foodborne Illness Investigation Guidance and Tools*, 1

³²¹ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

³²² Ohio Department of Health, *Foodborne Disease Outbreaks*, 2.

³²³ State of Rhode Island Department of Health, *Guidelines for Investigating Foodborne Illness Outbreaks*, 10.

³²⁴ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*, 1.

³²⁵ Utah Department of Health, *Foodborne Outbreak Investigation Guidelines*, 1.

³²⁶ Virginia Department of Health, *Foodborne Outbreaks*, 1.

³²⁷ Washington State Department of Health, *Foodborne Disease Outbreaks*, 4.

³²⁸ West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol*, 1.

³²⁹ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*, 1.

³³⁰ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*, 4.

³³¹ Ibid.

³³² Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual, Version 2*, 8.

³³³ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

³³⁴ Washington State Department of Health, *Foodborne Disease Outbreaks*, 4.

- “Exposure to the same food source” (MA³³⁵)
- “With the same exposure” (AZ³³⁶)
- “Or beverage” (MN,³³⁷ MO³³⁸)
- “Occurring within one incubation period of each other” (AZ³³⁹)
- “Within a 48 hour period” (KS³⁴⁰)
- “Or eating at a common restaurant/gathering” (LA,³⁴¹ Maricopa County³⁴²)
- “And epidemiologic evaluation implicates the meal or food as the source of illness” (LA,³⁴³ MA,³⁴⁴ Maricopa County,³⁴⁵ TX³⁴⁶)
- “And a specific food or meal is suspected” (LA³⁴⁷)
- “But person-to-person transmission or other exposures cannot be ruled out” (LA³⁴⁸)

³³⁵ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint/Outbreak Actions*, 8.

³³⁶ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

³³⁷ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*, 9.

³³⁸ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*, 8.

³³⁹ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 19.

³⁴⁰ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*, 13.

³⁴¹ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*.

³⁴² Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

³⁴³ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*.

³⁴⁴ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint/Outbreak Actions*, 8.

³⁴⁵ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

³⁴⁶ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*, 1.

³⁴⁷ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*.

³⁴⁸ Ibid.

- “Which has been implicated as a likely source of the illness by epidemiological analysis” (RI³⁴⁹)
- “Confirmed outbreaks may or may not be laboratory confirmed” (LA)³⁵⁰
- “An unexplained, unexpected increase of a similar illness, and food is a likely source” (Maricopa County,³⁵¹ VA³⁵²)
- “A situation when the observed number of cases unaccountably exceeds the expected number (i.e., an epidemic)” (WA³⁵³)
- “Exception: one case of botulism or chemical poisoning constitutes and outbreak” (MO,³⁵⁴ TX,³⁵⁵ WV³⁵⁶)
- “Suspect or confirmed illness due to intentional exposure” (WV³⁵⁷)
- “Not defined, but if more than one complaint from non-related individuals about illness that may be related to a facility or event is received, confirm diagnosis and call EpiTeam meeting to manage the investigation” (WI³⁵⁸)

C. A TEAM APPROACH

Foodborne outbreaks can range in size and complexity. While many cases and clusters of communicable disease can be handled routinely by one or two staff in a health agency, more involved situations may necessitate the efforts of multiple public health professionals. The North Carolina Institute for Public Health has observed that foodborne outbreak response can “range in size and complexity from a small number of individuals

³⁴⁹ State of Rhode Island Department of Health, *Guidelines for Investigating Foodborne Illness Outbreaks*.

³⁵⁰ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*.

³⁵¹ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

³⁵² Virginia Department of Health, *Foodborne Outbreaks*.

³⁵³ Washington State Department of Health, *Foodborne Disease Outbreaks*.

³⁵⁴ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*.

³⁵⁵ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*, 1.

³⁵⁶ West Virginia Department of Health and Human Resources, *General Outbreak Investigation / Notification Protocol*.

³⁵⁷ Ibid.

³⁵⁸ Wisconsin Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Manual*, 2.

engaging in a short telephone communication at a local level to a widespread multi-discipline, multi-agency and multi-jurisdictional response.”³⁵⁹ Effective outbreak response is inclusive of a defined multidisciplinary approach cognizant of effective communication and collaboration approaches.

Depending on the anticipated size of the outbreak, response may be a structured gathering of all responding stakeholders to coordinate the control, investigation, and management of an outbreak, or a discussion between two or more stakeholders following the identification of a case of exposure of concern.³⁶⁰ Regardless of the size of an actual or potential outbreak, the burden of response typically is the responsibility of a core team of individuals. While a variety of staff and subject matter experts may become involved in outbreak response, designated, competent professionals, and trained subject matter experts may be needed to take on various aspects of outbreak response, team approach, and control.

The American Public Health Association, in the 19th edition of its *Communicable Disease Manual*, guides professionals to establish an outbreak control team with a defined role, in response to an outbreak report, although the CIFOR recommends determining the composition of the core team long before an outbreak occurs.³⁶¹ Further, the CIFOR counsels that this team should meet regularly, and formally, with the minutes of meetings recorded.

Ideally, a jurisdiction will establish a team of professionals and subject matter experts, including “environmental health specialists/sanitarians, epidemiologists, microbiologists, nurses, physicians, public information specialists, and others (e.g., toxicologists) as needed.”³⁶² As New Jersey states, “The size and expertise of the team

³⁵⁹ North Carolina Center for Public Health Preparedness, *Focus on Field Epidemiology*.

³⁶⁰ World Health Organization, *Terrorist Threats to Food: Guidance for Establishing and Strengthening Prevention and Response System*, 4.

³⁶¹ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 25.

³⁶² International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 5.

will vary according to the scope of the outbreak and nature of the disease.”³⁶³ Arizona recognizes this concept as well, “Depending on the scope and size of an outbreak, the investigative team may include more or fewer investigators, and the different roles and responsibilities may overlap. Nonetheless, the outbreak investigators should work together to ensure that all necessary tasks are completed.”³⁶⁴ Due to the wide variation of resources in the states, the size and composition of the team also is a factor of personnel and resources available. Some positions do not exist in some states or jurisdictions. In smaller health agencies, the team may consist of one or two multi-tasking individuals. Regardless of the size of the outbreak, the protocols reviewed nearly universally mentioned these three core professions when investigative responsibilities are defined: epidemiologists (disease detectives), microbiologists/laboratory professionals, and EH specialists/sanitarians.

In addition, as Kentucky points out, suggested team members should “include persons who can provide clinical and diagnostic advice, epidemiological support, nursing services, public information, environmental health consultation and inspections and information technology support.”³⁶⁵ In other words, leverage all the specialized tasks that come into play during a well-organized investigation. It is important to remember, as Iowa puts forth, that many area experts, not included in the core list (e.g., state toxicologist, or an infectious disease physician), may be able to provide technical expertise and could be called to assist the team. Virginia recognizes at times that outside agencies need to be included as part of the investigation team. It can typically occur when a facility regulated by the state department of agriculture is involved, or when the circulation of an affected food is implicated. Although team synergy in widespread outbreaks can be a challenge, West Virginia has found that “in multi-jurisdiction

³⁶³ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

³⁶⁴ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 20.

³⁶⁵ Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual*.

outbreaks, roles and responsibilities are usually negotiated respectfully between jurisdictions.”³⁶⁶

In outbreak response, each team member’s work becomes the building blocks for the whole picture being worked on by the team; thus, close teamwork, rather than isolated labors, is essential.³⁶⁷ During larger and multi-jurisdictional outbreaks, the response team may also include professionals from other agencies and levels of government (state department health, the CDC, USDA, Department of Natural Resources, state department of agriculture or the private sector), such as recognized by Missouri.

Not only do the states investigate with a team approach, many also designate a team leader. Some have this role pre-assigned; others identify the team lead at the start of the outbreak investigation. New Jersey designates the team leader as the main point of contact and communication lead. West Virginia outlines the need to pinpoint likely team members and resources to be part of the investigation, to be equipped for fieldwork and to also identify a lead investigator.³⁶⁸ In Washington, state epidemiologists are responsible for coordinating the investigation of multi-county and multi-state foodborne disease outbreaks involving individuals. Similarly, in Rhode Island, where food protection is overseen by the state, the state department of health, the office of food protection, the office of communicable diseases, and the division of laboratories come together as a comprehensive and coordinated illness outbreak response team; each entity with its own team lead.

Missouri references preparing for an outbreak before it occurs by establishing a multidisciplinary investigative team, and Kansas stipulates that teamwork and close collaboration are essential components to successful investigations. As addressed earlier in Chapter II, some states have foodborne outbreak RRTs. Funded through cooperative agreements with the FDA, the teams are charged with building extensive partnerships and

³⁶⁶ West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol*, 3.

³⁶⁷ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 26.

³⁶⁸ West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol*, 3.

collaboration among the many partners who may need to work together to respond and resolve foodborne outbreaks. Half of the states reviewed in this research have received RRT funding from the FDA: Florida, Iowa, Massachusetts, Minnesota, Missouri, North Carolina, Rhode Island, Texas, Virginia, Washington, and West Virginia. Their RRTs go by varying names, such as Alabama's DETECT (Decrease Epidemiological Threats with Environmental Controls and Testing) and North Carolina's Epi-Team. Massachusetts has a state working group on foodborne illness control and a foodborne illness complaint response team. Kentucky's protocols refer to their epidemiology rapid response team.

On the other hand, the protocol document for North Dakota, and similarly Ohio, lists roles and responsibilities of the responders, but does not identify a team (or use the term). Washington only describes that state epidemiologists are responsible for coordinating the investigation of multi-county and multi-state foodborne disease outbreaks involving individuals. Utah details coordination where local health departments are urged to discuss the situation with the state Bureaus of Epidemiology, Microbiology and Food Safety and Environmental Health during their investigations. Wisconsin does not accredit a team, but does discuss coordinating environmental investigations with epidemiologic investigations being conducted by local health departments. Minnesota does not use the work "team," but embodies the concept as it lays out the investigation steps: "the state disease investigation section will notify the environmental health services outbreak coordinator, local epidemiology and the appropriate local environmental health department as necessary to arrange a conference call to identify the primary contacts, plan the response activities, make decisions about the investigation and identify agencies needing notification."³⁶⁹ Maricopa County, the only county in the group, has no mention of "team;" rather, it contains lists of agencies to keep informed.

A breakdown of the members of outbreak investigation teams can be found in Table 4.

³⁶⁹ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*.

Table 4. State Outbreak Investigation Teams

	AL	AZ	FL	IA	KS	KY	LA	MA	Maricopa	MN	MO	NC	ND	NJ	OH	RI	TX	UT	VA	WA	WI	WV
Case/Medical Investigators		✓	✓		✓		✓							✓								
Disease Control Representatives	✓										✓					✓				✓		
Epidemiologists		✓	✓	✓	✓	✓	✓			✓				✓		✓	✓		✓	✓	✓	
Environmental Health Specialists	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓		✓			✓		✓	✓		
Food Inspectors					✓		✓	✓				✓										
Health Care Providers					✓		✓															
Health Director										✓				✓			✓		✓		✓	
Health Educator														✓								
IT Specialists							✓				✓			✓								
Laboratorians	✓		✓	✓	✓		✓				✓						✓			✓		
Media					✓		✓															
Other Regulatory Agencies		✓			✓		✓	✓				✓										
Public Health Nurses	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓		✓		✓	✓		✓	✓	✓	
Public Information Professionals	✓									✓	✓			✓			✓					
Support Staff	✓										✓			✓					✓		✓	

West Virginia discusses identifying potential investigation team members, without stipulating particular professional titles. The agencies that do not mention outbreak teams discuss coordinating response, without specifying particular team parameters. Maricopa County's document contains a list of other agencies. To keep informed, North Dakota lists roles and responsibilities of the responders, while Utah lists agencies to consult with during response.

Ohio, while not listing team formation, does reference the CIFOR and IAFP guidelines, both of which recommend a team approach as excellent resources for investigations.

When it comes to leading an outbreak team, a number of states designate team leaders from within their staff. For instance, Washington lists the state epidemiologist, the associate director of health or the state food defense coordinator as the team leader.

However, most defer the designation of a lead person to the time an outbreak is suspected.

The North Carolina Center for Public Health Preparedness recommends that regular updates are provided to designated team leaders to assure coordination, measure progress in the investigation, and allow for feedback and direction to fellow outbreak team members. The team structure is important to coordinate communication and tasks among those involved in the response, including those inside and outside the lead agency.³⁷⁰

D. WHO IS THE KEY STAFF IN CHARGE OF COMMUNICATION?

Coordinating communication is essential to assure an accurate and timely exchange of messages and information between key stakeholders. Plans were reviewed to ascertain which staff members are responsible for assuring communication within and between agencies. This research was not inclusive of the roles of public information officers, or messages crafted specifically for the public. Designating key staff for inter- and intra-agency communication helps to assure the right information is disseminated to the right people at the right time. A well-designed communication map with a focal spokesperson helps to prevent unnecessary duplication, mixed messages, and avoidable delays. The IAFP describes this essential component, “delegate responsibility to a professionally trained person who is familiar with epidemiologic methods and food safety to direct the surveillance program, report to appropriate agencies and public health partners as needed, take charge when foodborne and enteric disease outbreaks are suspected and handle publicity during outbreaks.”³⁷¹

Pre-planning for communication is an asset in response, and several states address this topic. New Jersey recommends developing a communication plan that defines a designated individual in the organization responsible to lead communication to assure all involved are “provided with consistent information, rumors are minimized, and good

³⁷⁰ North Carolina Center for Public Health Preparedness, *Focus on Field Epidemiology*.

³⁷¹ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 4.

working relationships are maintained beyond the outbreak.”³⁷² Other states are more specific and recommend outbreak coordination that identifies agency and department leaders before an outbreak, and establishes a culture of consistent communication among local, state, and federal agencies.

Several states, such as Massachusetts, reference the need for a communication plan, but do not specifically establish a formalized section for this plan as part of their protocols. As described in their outbreak lexicon, “Coordination and communication with other members of the foodborne illness complaint response team (e.g., sanitarian, food inspector, public health nurse, the state department of health) is imperative. Additionally, be sure to keep others not directly involved in an outbreak informed (e.g., other board of health members or health department staff).”³⁷³

In lieu of a separate communication map, protocols from Arizona and Kentucky include extensively detailed roles/responsibilities that enumerate communication points for all team members. Within these roles and responsibilities, it is specified that the primary investigator and the state outbreak epidemiologist should retain consistent dialogue with each other throughout the investigation.

Many states do not have a regular designated individual, and prefer to identify a communication point person or arrangements for information exchange during the food illness event. Some imprecision does occur in the protocols as to how the key communicators are selected, or who acts in that capacity. The defined centerpiece for communications is most commonly attributed to a department, branch, or agency, (e.g., “local health department,” “branch staff,” or “state division of disease control”) and not a title or person. Florida explains this rationale, by describing that key staff, and key staff responsible for communication, is outbreak specific. Its protocols detail this function thusly, “Establish who will take the lead in an outbreak investigation. Determine how,

³⁷² New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*, 10.

³⁷³ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint/Outbreak Actions*.

when and who will contact the regional Environmental Epidemiologist when it is decided that an outbreak is suspected.”³⁷⁴ Minnesota expounds on this concept:

The state disease investigation section will notify the environmental health services outbreak coordinator, local epidemiology and the appropriate local environmental health department as necessary to arrange a conference call to identify the primary contacts, plan the response activities, make decisions about the investigation and identify agencies needing notification such as the USDA, FDA, CDC and the state department of agriculture.³⁷⁵

Louisiana, takes a different approach. This state has a food protection RRT to unify and coordinate outbreak response. If a decision is made to activate the state’s RRT, it is the regional RRT coordinator’s responsibility to coordinate outbreak response duties with all team members and be bound to advising the regional administrator and medical director of all pertinent outbreak information and updates at least daily.

Just as an outbreak investigation has (or should have) a plan designating roles and responsibilities, a scheme for the exchange of information should be defined, both for routine matters, and especially for emergent and outbreak situations. As Kansas points out, most outbreak communication will occur between the local health department infection control nurse, the food inspector assigned to the outbreak, the regional medical investigator, and an epidemiologist. However, sometimes an outbreak affects a broader range of stakeholders. The greater the number of entities and public health personnel involved in the outbreak response, the more challenging the communication structure can become. North Dakota’s protocol illustrates some of the communication tiers:

If sufficient information indicates a foodborne outbreak, the state Division of Disease Control has the responsibility to notify the local health unit with jurisdiction; the Division of Food and Lodging and/or Environmental Health Agency with licensing or regulatory authority; the Division of Laboratory Services, and the Department Operations Center if additional resources are needed. In addition, the division of disease control epidemiology section will coordinate as necessary with state and local public information officers to coordinate the distribution of news releases,

³⁷⁴ Florida Department of Health, *Food and Waterborne Disease Surveillance and Investigation*.

³⁷⁵ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*.

health alerts, conference calls and memos, the Centers for Disease Control and Prevention. (CDC) and other federal agencies, and out of state health departments.³⁷⁶

Michigan details communication as an ongoing assignment. The state's protocols establish that public health professionals should identify agency and department leaders before an outbreak, and create modes of consistent dialogue among local, state, and federal agencies. When planning an investigation, a team leader should be selected to manage the outbreak and assign particular job duties related to the incident. If an outbreak spans multiple jurisdictions (areas/agencies), the regional communicable disease coordinator should be consulted to assist in determining the appropriate lead agency.

Regardless of the individual state's structure, it is essential during an outbreak that all stakeholders are providing updates to the entire outbreak team, and maintaining regular bi-directional communication in this accord throughout the investigation.

1. Inclusion of Contact Information

The aim in the prompt reporting of suspect foodborne illnesses is to detect an outbreak as soon as feasible so as to intercede and control the spread of disease among persons at risk. Suspect foodborne outbreaks, and diseases or incidents, such as foodborne intoxications, acute hepatitis A, and intentional foodborne contamination require immediate reporting to the regulatory health authority. Such incidents do not always align with normal business hours.

Contact lists are an essential tool when looking to streamline prompt communication to another person or agency. Quick references help assure no time is lost looking up phone numbers or email addresses, and support effective information exchanges by directing delivery to the intended audience. The CIFOR strongly encourages agencies to update all contact lists at least twice a year, and make them available in electronic and hard copy formats to all public health partners. In addition, the

³⁷⁶ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*.

CIFOR also recommends establishing standard operating guidelines for all personnel participating in multiagency, multijurisdictional conference calls.³⁷⁷

With this in mind, the state protocols were reviewed to ascertain if they were inclusive of ways to communicate not only during business hours, but also for nights, weekends, and holidays.

Despite the need and value of phone lists, not all states include them directly in the protocols, or as part of appendices. Most only include telephone numbers that direct back to the state or parent agency, and have no contact listing for other known stakeholders. One notable exception, Alabama’s foodborne outbreak protocols document, is absent of any contact information, including emails, phone numbers and the like. Conversely, Massachusetts looks to forestall possible communication gaps by instructing users to “maintain a list of people on your board of health and in the local community to contact in an outbreak, including hospitals and emergency rooms. Notifying area health care providers may aid in the identification of related cases.”³⁷⁸

Minnesota and Kentucky each include a phone list, as does Iowa, which also incorporates a toll-free 24/7 voicemail/fax. Maricopa County, Massachusetts, and Virginia include phone numbers throughout the document, but fall short of including them in one easily referenced list. Kansas, New Jersey, and North Dakota have links or references to other web-based locations for current phone lists. The Ohio protocol contains a phone list for the state EH and food safety program, the state laboratory, the state department of agriculture, as well as the hotlines for the FDA and USDA. Kansas’ protocol contains some telephone numbers to state agencies throughout the document, on decision trees, and on a checklist, as well as a reference to a public health directory website. However, under this state’s list of agency contacts, instruction is given to “see directory.” Texas uses a different approach by listing several state agency phone numbers under “special instructions” in a foodborne illness reference chart. Utilizing a

³⁷⁷ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 104.

³⁷⁸ Massachusetts Department of Health and Human Services, *Foodborne Illness Complaint/Outbreak Actions*.

geographical approach, Missouri's phone list includes a map and contacts for outbreak designees in each region. Rhode Island had the most comprehensive phone list, which included the health director, epidemiologists, laboratories, regulators, food protection office, supervisors, inspectors, and administrators on call. The contact directory in its protocols included spots for phone, cell phone, pager, fax numbers and after hours numbers for agency professionals by name, division, program, and title.

States with protocols that specifically listed after-hours contact information were Iowa, Kentucky, Massachusetts, and New Jersey. Wisconsin and Maricopa County listed both an after-hours phone number and fax. Louisiana had one 24-hour number. Kansas included phone, email, and fax; however, the email and fax did not stipulate if they were monitored round-the-clock.

New Jersey recognized that health professionals and the public must have a way to notify the local health department immediately of a possible communicable disease incident. Its guidance conveys that health officers should set up an after-hours emergency contact number for the public, provide local police department with 24/7 contact info, and ensure the state emergency contact red book directory is updated. Florida provided a back-up contingency for when regional environmental epidemiologists are unavailable, and instructs responders to call the food and waterborne disease coordinator using the listed phone number.

Email was not universally included in the documents, but North Dakota did include email contact. Missouri requests that regulators "maintain a current phone directory, including email and Internet addresses, home addresses and phone numbers of team participants, and key contact personnel outside the local public health agency."³⁷⁹ Minnesota had the most detailed listing. In addition to phone and fax for business hours, an after-hours phone and emergency pager, a local and toll-free foodborne illness reporting hotline, and the cell number of several managers were listed. Lastly, Wisconsin did not include a physical or postal address.

³⁷⁹ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*, 2.

Interestingly, no protocol included the concept of 3x3 redundancies in call down lists, where a health agency designates three staff members with three means of contact to assure notification and response for all emergencies.

2. Receiving Outbreak Information

The states reviewed recognize the benefit of being aware of the baseline disease burden in their communities. Missouri references the need to “maintain adequate local surveillance systems.”³⁸⁰ Wisconsin discusses “diligent public health surveillance provides an accurate assessment of the status of the health of the community.”³⁸¹ Kansas refers to how “foodborne illnesses are monitored through the statewide surveillance system to assess disease impact, to detect trends, and to guide interventions.”³⁸²

The IAFP explains that:

public health is typically advised of a potential foodborne outbreak by receiving an alert or complaint about foodborne illness, food spoilage, adulteration of a product, or even mislabeling. This type of notification can be originated from physicians’ reports, by notices of foodborne pathogens isolated by clinical laboratories, or by referrals from poison control centers. Hospitals, medical centers or emergency squads may forward reports of treatment for enteric disease. These alerts can also take the form of advisements or an increase in a particular PFGE pattern from clinical isolates.³⁸³

Passive surveillance, or the routine receipt of disease case reports from healthcare providers, medical laboratories, and other public health agencies, is a common form of morbidity data collection for health departments. Schools may report increased rates of absenteeism, or pharmacies increased consumer purchases of over-the-counter remedies for gastrointestinal symptoms. Common across the states, a number of reporting sources

³⁸⁰ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*.

³⁸¹ Wisconsin Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Manual*.

³⁸² Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*.

³⁸³ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 6.

are statutorily required to advise the health authority of certain pathogens and diseases, otherwise known as notifiable conditions reporting. As New Jersey explains, by state law, health care providers, public health labs, and administrators of institutions are obligated to advise the health authority of any individual diagnosed with any reportable disease within a specified timeframe.³⁸⁴

In addition, it is not unusual to receive passive reporting of foodborne illness symptoms from members of the public, as oversight of retail food establishments is likely one of the more well-known functions of a health authority. Passive surveillance is of value to public health because of its continuous advantageous nature, and its need for few resources to implement and maintain.³⁸⁵ The health agency receiving illness information can review the data provided, and from this review, may identify increased levels of diseases or common symptoms. Although this quiescent receipt of data may not capture all potential outbreaks, it is an efficacious scan for outbreak indicators.

Connectivity between passive reporting sources and the health agency is primarily through well-established business communication methodologies: telephone, fax, email, and in-person correspondence. With the availability and ease of accessibility provided by computer tracking systems, some states utilize electronic reporting portals as part of their passive surveillance scheme; however, most of the protocols reviewed were not descriptive nor inclusive of specific electronic reporting systems in use. Those that specifically mention electronic reporting include New Jersey and Kansas, both of which conduct monitoring through a statewide surveillance system that identifies morbidity and provides data on disease trends, which helps assess local and regional disease impact, and provides necessary information to guide interventions. Ohio uses the NORS database, while Minnesota specifically references PulseNet.

Consumer complaints are often the mode by which a health department is made aware of a potential food-related illness. Virginia recognizes that a telephone call may

³⁸⁴ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

³⁸⁵ “Surveillance for Infectious Disease,” accessed November 17, 2015, http://sphweb.bumc.bu.edu/otlt/MPH-Modules/EP/EP713_Surveillance/EP713_Surveillance4.html.

provide the first indication that an outbreak has occurred, and can provide valuable details for initial response actions. Minnesota encourages these types of calls by sponsoring a statewide foodborne illness reporting hotline, as does Kentucky. Maricopa County, not wishing to miss a call after business hours, uses poison control centers to cover calls on weekends.

Some states did not detail from where their first notice of foodborne illnesses tend to originate, although it may be comfortably presumed that sources are similar across the United States. Prevailing passive surveillance sources for the states and county include the following:

- “Foodborne illness complaints from private citizens”³⁸⁶
- “Medical evaluations of ill individuals from healthcare professionals at hospitals, clinics or physicians’ offices”³⁸⁷
- “Routine laboratory testing and techniques”³⁸⁸
- “Information received through the media and public information officers”³⁸⁹
- “Reports from local, state and federal food safety regulators”³⁹⁰
- Reports from the community: food establishments, schools, residential facilities, child care establishments, and others
- “Routine surveillance and case investigation of reportable diarrheal illnesses by state and local public health agencies”³⁹¹

In addition to these common informants, less traditional partners were also mentioned. Missouri included notifications from law enforcement, and Texas stipulated the value of reports from poison control centers. Aware of potential cross-over with zoonoses, New Jersey protocols include veterinarians, certified animal control officers,

³⁸⁶ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*, 4.

³⁸⁷ Ibid.

³⁸⁸ Ibid.

³⁸⁹ Ibid.

³⁹⁰ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 19.

³⁹¹ Ibid.

and managers of animal facilities as possible sources of outbreak information. All these items are beneficial to monitor, as they may suggest outbreaks, contributory situations, disease impact, or detect trends.³⁹²

Protocols were also gauged to review what surveillance or reporting systems are being used to record, track or share information on potential outbreaks. Complaints of foodborne illness, even singular, are usually placed into a log or database for tracking and analyzing to detect clusters. If a cluster of cases is identified, health officials should look to review actively any information forwarded from physicians or laboratories, as receipts of food complaints may suggest outbreaks of disease or related information. Rhode Island's document expounded its process. Upon receiving disease reports, the state counts and analyzes information in hand, and reviews it weekly to ascertain potential disease clusters by person, place, or time, to determine any escalation in enteric diseases.

Many states reference what they receive, not the medium or mode in which they are received or if their method of recording is logging on paper, electronic, or both.

While passive surveillance is beneficial in identifying the first stages of an outbreak, a time may come in an investigation when additional outbreak data is needed. As Kentucky contemplates:

With the case definition in place, the next half of the equation is to decide how to find additional cases, (i.e., routine methods versus more intensive methods).

Is it reasonable to rely on telephone reporting from physicians? Should case reports be actively solicited from area physicians, laboratories, or hospitals?

Should the help of the local media be enlisted? These are all “judgment calls” which must be made while taking into account the severity of the disease, how widespread it is, the urgency of intervention, and the manpower available to find and interview case patients.³⁹³

³⁹² International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 7.

³⁹³ Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual, Version 2*.

These questions illustrate the thought process involved in transitioning surveillance activities from passive to active. Active surveillance occurs when a health agency reaches out to labs or healthcare entities to gather information on the existence of illnesses. As undertaking this surveillance takes considerable resources, it is typically not conducted as a routine surveillance measure, but rather to provide a more specific picture of disease frequency, or to identify additional cases during an outbreak.³⁹⁴

Virginia's protocols describe some mechanisms of active surveillance:

Conduct surveillance, i.e., actively search for cases and for all persons exposed to the suspected source of illness. Ill persons or group organizers may be able to identify others who had the same exposure (that is, attended the same event) and who need to be interviewed, regardless of their illness status. If the outbreak occurred among a group attending a meeting in a hotel or other place where multiple groups can meet simultaneously, a contact person from the other groups who held meetings at the same location should be contacted to see if any illness has occurred. If the illness is not confined to an identifiable group, such that illness may be occurring in the community, cases may also be found by contacting emergency departments, physician offices, ambulatory care centers, etc.³⁹⁵

As previously mentioned, laboratories are important partners in the surveillance process. Although tasked to forward lab reports that identify gastrointestinal disease within a designated time frame, workplace realities sometimes preclude this passive surveillance from occurring as prescribed. As such, West Virginia protocols mention the use of “enhanced passive surveillance,” where a letter or memo is faxed or sent to clinical labs or healthcare providers with a request to report back with details on any individual who meets an outbreak's case definition. Additionally, West Virginia refers to active surveillance, where providers are personally contacted and requested to report cases that meet a case definition. In a search for additional cases in an outbreak, North Carolina advocates contacting clinical laboratories to see if they conducted laboratory testing on

³⁹⁴ “Outbreak Investigations,” accessed November 19, 2015, http://sphweb.bumc.bu.edu/otlt/MPH-Modules/PH/Outbreak/Outbreak_print.html.

³⁹⁵ Virginia Department of Health, *Foodborne Outbreaks*.

cases and obtained specimens. Arizona explains the advantages in that “active surveillance provides more timely data with less variability than passive surveillance.”³⁹⁶

Obviously, the sooner a public health agency becomes aware of a suspected foodborne outbreak, the earlier investigations and interventions can be established. The requirement for medical labs and healthcare providers to report certain diseases to the health agency has already been discussed. Several protocols described further how notification for non-reportable diseases or reports of enteric symptoms from members of the public are received. If a web-portal, or a reporting hotline is available, such resources should be made well known to the public to assure use.

Although electronic reporting may be a modern and direct way of outbreak disclosure, no matter how a health agency receives the information, preferably in a timely manner, the notification is accomplished. Notwithstanding, several states specify the preferred method of transferring outbreak information. Virginia’s Boards of Health require that local health departments are advised of potential enteric epidemics by the most rapid means available, which their protocols identify as “i.e., by telephone.”³⁹⁷ Missouri defines “as soon as possible” to mean “by phone or email,” and in the same document declares, “outbreaks are a Category I disease and shall be reported to the local health authority or to the state department of health within 24 hours of the first knowledge or suspicion by telephone, facsimile or other rapid communication.”³⁹⁸ Kansas, too, enumerates a reporting time frame, but not a mechanism for information transfer; outbreaks of disease, no matter the cause, must be reported to the state health department within four hours.³⁹⁹ Ohio requests reports of suspected outbreaks be

³⁹⁶ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*, 68.

³⁹⁷ Virginia Department of Health, *Foodborne Outbreaks*.

³⁹⁸ Missouri Department of Health and Senior Services, *Communicable Disease Investigation Reference Manual*.

³⁹⁹ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*.

telephoned to the outbreak response and bioterrorism investigation team for subsequent entry by the local health department in the CDC's NORS database.⁴⁰⁰

E. INTRA-AGENCY COMMUNICATION

Having clearly defined methods for intra-agency information exchange and maintaining close communication among those included in outbreak interventions is fundamental in assuring a coordinated response. While established guidelines may be generalized to allow for situational flexibility, enough specificity needs to be available to assure appropriate and timely notifications to all who should be included in the outbreak response conversation. Essential communication considerations should include: Who do you contact? When? How? With what information? Who do these recipients share information with in turn? Methods used should include modes of providing information exchange with members of the outbreak team, as well as others in the agency obliged to be notified and updated.

The protocols included in this study were reviewed for the inclusion of intra-agency guidelines for communication, including these points recommended by the CIFOR:

- “Decide who will be notified when an outbreak is suspected on the basis of roles, including any changes in notification according to the nature of the outbreak (e.g., pathogen type, involvement of commercial product) and timing (weekends and holidays versus week days).”⁴⁰¹
- “During an outbreak response, maintain close communication and coordination among outbreak response team members.”⁴⁰²
- “Prepare contact information (including after-hours information) for people in the agency who should be contacted in the event of an outbreak, including backups.”⁴⁰³

⁴⁰⁰ Ohio Department of Health, *Foodborne Disease Outbreaks*.

⁴⁰¹ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 4.

⁴⁰² Ibid.

⁴⁰³ Ibid., 3.

- “During an outbreak response, arrange for the outbreak response team to meet daily to update the entire team in a timely manner.”⁴⁰⁴
- “During an outbreak response, communicate actions taken and new outbreak information to all members in the outbreak response team.”⁴⁰⁵
- “Determine whether and how confidential information (e.g., from forms and questionnaires) can be shared within the outbreak response team before an outbreak occurs.”⁴⁰⁶

Protocols were searched for any instructions or references along the lines of these CIFOR recommendations, and also to ascertain how a state recommends fostering communication with the outbreak team, within the office, and within the lead agency. For this parameter, “intra-agency” was broadly interpreted, as agencies may have a variety of departments, divisions, and regional offices as part of a parent state structure. In this intra-agency category, all the states include processes to address communication within the state agency, although the particulars vary from agency to agency. Communication methods were ascertained by looking at the listed roles and responsibilities of each agency for terms that related to information exchange, such as meet, consult, contact, communicate, and recommend. The progression of communication differs in the protocols, based on the hierarchy and interconnectivity of the agency. State-level agencies handling health, agriculture and/or infectious disease have, by their nature, aspects of integration with regional, county, and local offices within their state borders. This integration applies to offices directly under the authority of the state agency, or with a working/reporting systems type of relationship.

Some states’ protocols, such as New Jersey, only address upwards communication, where a local health agency is mandated to report to the state department of health. Maricopa County’s *Outbreak Investigation Guide* contains a checklist that

⁴⁰⁴ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 3.

⁴⁰⁵ Ibid., 4.

⁴⁰⁶ Ibid.

specifically identifies communication steps, starting with “contact supervisor by phone or pager to alert her/him of possible outbreak.”⁴⁰⁷

Others require contact with state and regional agencies, but several also include a top-down requirement for outbreak notification, where the state will apprise a regional/local agency if a suspected or actual outbreak is affecting someone in its jurisdiction, as exemplified by Florida. This contact is typically dependent upon which agency is the primary lead for an outbreak.

When an investigation is launched, advising all departmental or agency staff, not just the coordinating team, that an outbreak is being handled, can be beneficial, so as to prevent misinformation, and help direct misplaced inquiries to the correct personnel. Notwithstanding, the list of people or agencies to be notified could be very short, or extremely long, based on an agency’s size, structure, or standard operating procedures.

Notably absent from documents reviewed was the inclusion or reference to a phone tree, or modern communication notification list with sufficient redundancy to address any difficulties in tracking down specific people and to ensure if some staff cannot be contacted, the message still gets through. Some addressed this area in an alternative, but less convenient fashion, by setting it down in roles and responsibilities of specific state agencies, job positions, or the outbreak team.

F. ELECTRONIC DATA EXCHANGE

Some reporting requirements are via electronic database to transfer essential information to another agency staff person. New Jersey requires the use of its electronic system if a suspected outbreak is caused by a reportable or communicable disease. Agencies within the same computer network can monitor documents and the progress of the disease and investigation. For large or high-profile outbreaks, Alabama stipulated that staff notify epidemiology, environmental, and nursing directors by email with a message to monitor the shared computer drive during an active outbreak investigation. In this case,

⁴⁰⁷ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

what works for one state may not for another, based on the variability of computer systems and software.

New Jersey and Utah require local health departments to report (defined as within 24 hours) all suspected outbreaks immediately to the state department of health. Florida has a similar timeframe for a county health department to forward complaint information to the agency of jurisdiction, via fax, email, or phone. Whereas Minnesota and West Virginia also require immediate reporting, they do so without a definition of what is considered immediate. Utah discusses the timeframe for the state agency to report to a local entity, and adds contingency instructions for notifications received during holidays, weekends, and after working hours, when the information is forwarded to the local health officer on the next business day unless the situation is deemed an emergency.

Is outbreak communication directed toward an agency, position, or specific person? As the person holding a specific title may change, all the protocols cautiously refrained from inserting specific names into their contact hierarchy, and used the broader category of position titles. Some states' listings are generic, and require that suspect foodborne outbreaks be reported to the state, the responsible epidemiologist, or the local health department from where the incident is originating. Others have an organizational web to navigate in assuring the appropriate information transfer. Some, such as Louisiana, distinguish between specific job titles and divisions, in their instance, "Regional Medical Director/Administrator, other regional staff (Epidemiologist, Disease Surveillance Specialist, Sanitarian), and the Infectious Disease Epidemiology Section."⁴⁰⁸ Communication between the local outbreak team leader and the New Jersey Department of Health epidemiologist is encouraged via the local outbreak team leader, who is expected to continue regular dialogue and updates on the outbreak situation, both daily and weekly.⁴⁰⁹ As a rule, most of the communication listings were dispersed from the director level to the staff level. Some of the communication responsibilities appear quite confusing to someone not familiar with the hierarchy and public health structure of

⁴⁰⁸ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*, 3.

⁴⁰⁹ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*, 13.

a specific state. Communication flow charts or public health call trees would be beneficial in these incidents for the expediency of information exchange.

All outbreak response plans reviewed reflect reciprocity in initial notifications, depending on who first has knowledge of the existence of a possible foodborne outbreak. It was fairly universal to see requirements that the state contact a local agency in case of a suspected outbreak, and local agencies are expected to notify the state if they are the first with potential outbreak information. In other words, whoever has breaking information on an outbreak must notify the other agencies. However, notifications can become labyrinthine, depending on the outbreak circumstances.

North Dakota provides an example of the agency notification responsibilities, depending on who initially has knowledge of the occurrence of a possible foodborne outbreak. For instance:

- “In case of outbreak, the state division of Disease Control will notify the local health unit with jurisdiction; the Division of Food and Lodging and/or Environmental Health Agency with licensing or regulatory authority; the Division of Laboratory Services, and the Department Operations Center if additional resources are needed.
- If the city or local environmental health agency is first to receive notification of the occurrence of a possible foodborne outbreak, they must notify the Division of Disease Control with specifics.
- Upon notification of the occurrence of a possible foodborne outbreak, the Division of Food and Lodging will notify the State Division of Disease Control; the city or local environmental health agency who has jurisdiction; and any necessary federal agencies.
- Upon notification of the occurrence of a possible foodborne outbreak, the Division of Health Facilities will notify the state Division of Disease Control and the city or local environmental health agency that has jurisdiction.
- Upon *completion* of the occurrence of a possible foodborne outbreak, the State Meat/Poultry/Dairy Inspection Program will notify the state Division of Food and Lodging; the Division of Disease Control; the city or local environmental health agency that has jurisdiction; and any necessary federal agencies.”⁴¹⁰

⁴¹⁰ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*.

All the states included or alluded to offers of outbreak response assistance from the state agency. For additional capabilities, North Carolina advises local agencies to consider calling their state health department and food protection branch regional EH specialist even if the health agency does not require assistance.

When intermediate agencies are part of the equation, communication can become more complicated, necessitating an information-distribution chain. County health departments in Florida, for example, are asked to keep the regional environmental epidemiologist notified of a foodborne outbreak, even if they do not require assistance. The regional environmental epidemiologist is then required to ensure the food and waterborne disease coordinator in the state bureau of epidemiology is kept informed, and also is required to notify directors of developments as they occur.

How are notifications accomplished? Texas' document included a state foodborne illness chart, with contacts for specific diseases and situations listed under "special instructions." In Florida, these communications may occur via email, face-to-face meetings or conference calls. Virginia specifies the use of the most rapid means available, specifically mentioning the telephone, as do the states of Ohio and Texas.

The states use a variety of terms to capture the essence of communication; many of these terms are general enough to provide both specificity and ambiguity, in the absence of agreed upon particulars. These terms include:

- "notify" (MN,⁴¹¹ ND,⁴¹² UT⁴¹³)
- "kept aware of all developments" (FL⁴¹⁴)
- "share pertinent info" (VA⁴¹⁵)
- "report to" (UT⁴¹⁶)

⁴¹¹ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks*, 3.

⁴¹² North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*, 6.

⁴¹³ Utah Department of Health, *Foodborne Outbreak Investigation Guidelines*, 2.

⁴¹⁴ Florida Department of Health, *Food and Waterborne Disease Surveillance and Investigation*, 5.

⁴¹⁵ Virginia Department of Health, *Foodborne Outbreaks*, 4.

⁴¹⁶ Utah Department of Health, *Foodborne Outbreak Investigation Guidelines*, 1.

- “contact” (KS⁴¹⁷)
- “coordinate with key personnel”(KS⁴¹⁸)

The range of agency communication stratus illustrates the problem of constructing optimal network trees that satisfy given communication requirements particular to the providing and receiving agencies.

G. INTER-AGENCY COMMUNICATION

An established framework for two-way communication with other agencies, stakeholders, and partners helps center outbreak response and assures the right people receive the necessary information in a timely fashion. In addition to the notifiable disease requirements, as previously discussed, prompt data exchange between public health partners is essential to address an outbreak situation appropriately.

Even a small outbreak confined to a single jurisdiction may require the transfer of data and updates to others. If an outbreak is more expansive, the CIFOR observes, “a multijurisdictional foodborne disease event requires the resources of more than one local, state, territorial, tribal, or federal public health or food-regulatory agency to detect, investigate, or control.”⁴¹⁹

1. Communication Plan

As a communication plan is pivotal to a coordinated outbreak response, the states’ documents were reviewed for references to such a policy. While it is very likely that many of the agencies reviewed share reciprocal communication during an outbreak, such exchanges are discussed only briefly in the protocol documents. Communication with other public health stakeholders is an aspect of the state protocols that varies in the level of detail based on agencies’ requisites. In this regard, Arizona explains, “a strong and flexible public health infrastructure is the best defense against any disease outbreak—

⁴¹⁷ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*, 35.

⁴¹⁸ *Ibid.*, 34.

⁴¹⁹ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 191.

naturally or intentionally caused. As with all public health events, coordination and cooperation among all agencies are critical to the success of any response.”⁴²⁰ In accordance with this strategy, Arizona’s document lists roles and responsibilities that include a number of steps on coordinating and “maintaining communication channels between programs, agencies, counties and states, as needed.”⁴²¹ Massachusetts proactively prepares for outbreak communication by keeping a list of board of health members and local community contacts needed in the event of an outbreak, including hospitals and emergency rooms. This structure echoes New Jersey’s provision that a phone list of stakeholders is essential, as the state encourages local and county health departments to stay in contact with their partners during an outbreak to minimize rumors and keep information consistent. The CIFOR advises that agencies should maintain a contact list for those within and outside the health agency who may be players in outbreak response. The CIFOR also recommend these lists be updated often, as well as when agencies restructure or if staffing and/or title change.⁴²²

2. Communication with Other State and Local Health Agencies

New Jersey recognizes the potential issues that can arise if an outbreak crosses jurisdictions. Their protocols counsel, “As soon as possible, share information with other local health officials who may become involved in the investigation. This may include Health Officers who have jurisdiction where (a) the outbreak may have originated; (b) the local school or institution attended by the cases is located or (c) the workplace of the cases is located.”⁴²³ They promote using the state’s health alert network to send necessary messages to other public health professionals connected via the network.

Kansas has a similar appreciation, and counsels that health professionals from contract agencies or the state health agency may need to be advised, but it could vary

⁴²⁰ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

⁴²¹ Ibid.

⁴²² Ibid.

⁴²³ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

upon the county affected or the type and source of foodstuffs implicated. Utah is comparable in this regard, as it details its Bureau of Epidemiology will communicate with local health agencies regarding epidemics that may have implications for additional agencies in the state, or have the potential to create media interest. West Virginia sets a timeframe for the notification of the health departments at the state and local level, as well as the epidemiologist for the region, its Office of Laboratory Services and, if needed, the CDC. It specifies a timeframe of 90 minutes for this correspondence to occur ideally, as it is a condition of its bioterrorism grant funding. The requirement to communicate and work with affected businesses is part of Massachusetts' plan, and also stipulates a requirement to work with local, state, and federal counterparts when tracebacks are essential, as this situation typically spans beyond one jurisdiction. Typically, as Utah indicates, laboratories involved with outbreak testing will report test results to the agency leading the investigation, as well as its Bureau of Epidemiology.

State and local communication among a variety of agencies can be perplexing unless specifically spelled out for staff. Virginia outlines the intricate interplay between the Virginia Department of Agriculture and Consumer Services and the Offices of Dairy and Food and Meat and Poultry Services:

- “Within the Virginia Department of Agriculture and Consumer Services, reports of foodborne illness are most often reported to the Office of Dairy and Foods. The Office of Meat and Poultry Services will notify the Office of Dairy and Foods when they are notified of a possible outbreak. The Office of Dairy and Foods will notify the Office of Epidemiology by telephone. If a food traceback and/or recall may be required, Virginia Department of Health employees should call and discuss this with someone in the Office of Epidemiology, and Virginia Department of Agriculture and Consumer Services employees should call the Office of Dairy and Foods.
- The Central Offices of the two agencies will consult with each other and determine the need for and logistics of a recall, including whether the FDA needs to be involved. The Virginia Department of Agriculture and Consumer Services' office of Dairy and Foods will notify Meat and Poultry Services for actions in accordance with the FSIS directive.”⁴²⁴

⁴²⁴ Virginia Department of Health, *Foodborne Outbreaks*.

The interplay of the people and agencies involved in local and state outbreak response necessitates a clear, written communication plan that details who is receiving the information, when this information needs to be exchanged, how this exchange will occur, who is the person or agency responsible for the delivery of the message, and how to confirm the message has been received and understood.

3. Communication with Federal Agencies

Generally, outbreak communications with federal agencies are the responsibility of state agencies, as the overseers of disease response operations in their respective states. Small or conventional outbreaks handled by local health departments are not elevated to the point of needing federal guidance. However, depending on the type and severity of an outbreak, states may choose to send federal partners a response report at the conclusion of the outbreak (for smaller or “routine” outbreaks), or contact them for awareness and/or assistance (for larger, unusual, or ongoing situations). In the protocols reviewed, most references to communication with federal agencies are in the form of completing and submitting the voluntary outbreak summary reports to the CDC. For example, Ohio, New Jersey, and North Dakota submit information to the NORS, and West Virginia’s Epi Program reports foodborne outbreaks to the EFORS within 60 days of the first disease onset.

In the state of North Dakota, if information in hand points to a foodborne epidemic, its Division of Disease Control is instructed to notify the CDC, as well as other federal agencies and out-of-state health departments. Iowa provides an additional example of this process, by pronouncing that its state agencies will notify the federal, as well as other appropriate state health agencies if an outbreak is widespread or severe. Texas has a similar perspective if a meat or poultry product under federal inspection is suspected to be the causative agent; the regional USDA compliance staff must be notified and kept informed.

When it comes to requesting additional assistance from federal agencies, Florida mandates the following, “requests for EpiAid from the CDC must come from the county health department through the state’s food and waterborne disease coordinator, as CDC

cannot send anyone into the state to investigate unless they are specifically invited to do so by the state Epidemiologist.”⁴²⁵

Some states reference other agencies within the protocol document, but do not prescribe a particular pattern for information dissemination. Wisconsin, for example, includes 16 state or federal agencies in its acronym list that may have a role in its outbreak response.

As listed by the states, external partners can most commonly include other local health departments, state departments (health, agriculture), laboratories, federal agencies, homeland security, law enforcement, and healthcare providers. Although bi-directional communication would provide the best coaction for outbreak coordination with these entities, expectations of responses from stakeholder communication is not clearly defined in the guidance documents.

While not the primary focus of this research, it should be noted that some states—Alabama, Kentucky, Louisiana, and New Jersey—address information dissemination to the media or the public, and include the involvement of health educators, health promotion specialists, and public information officers. Utah’s health officers at the grassroots level are required to advise the state bureau of epidemiology regarding any communication being considered for public release. New Jersey notes prophylactically providing regional agencies with all-hazards risk communication plans for use in the event of a large-scale public health emergency, with the intent that pre-developed messages for outbreaks, will assure that all public health agencies are communicating with the public in a clear and consistent manner.

H. INCIDENT MANAGEMENT SYSTEM

The ICS can benefit disease outbreak investigations undertaken by public health agencies, as it provides a standardized approach to an event that may involve numerous staff, multiple agencies, and a number of jurisdictions. FEMA describes the ICS as “a standardized on-scene emergency management construct specifically designed to provide

⁴²⁵ Florida Department of Health, *Food and Waterborne Disease Surveillance and Investigation*.

for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.”⁴²⁶ The ICS is scalable as the investigation or number of victims grows, and can incorporate bringing additional public health staff into the investigation.⁴²⁷ As such, the ICS is valuable tool to use to coordinate a foodborne outbreak response of any size.

Despite the value of the ICS in situational management, and the DHS requirement of ICS 100/700 for response personnel, only three of the 22 states and county referenced this requirement in their outbreak response plans: Kentucky, New Jersey, and Rhode Island. These states note that the ICS may be activated during a complex outbreak, and include a chart or ICS template for reference. In addition, Kentucky recommends that its outbreak responders, in accordance with its ICS cooperate with and provide communications to other agencies and organizations including federal, state, and local health departments, veterinarians, producers, and animal owners within the state.

I. PROCESSES AND TECHNOLOGIES USED TO SUPPORT OUTBREAK COMMUNICATIONS

This study looked to identify existing processes and technologies currently employed by health agencies to support foodborne outbreak communications. As suggested in the CIFOR guidelines, “define a formal communication process for agencies of the outbreak response team for use during outbreaks. Options include daily phone calls and routine email alerts.”⁴²⁸ Unsurprisingly, the telephone, a ubiquitous business essential, is the most common device in use by health departments, as all protocols reviewed reference a phone or list phone numbers. Chapter II discussed at length the wide range of nets, cores and electronic portals that are assets to intra- and inter-agency exchanges. As mentioned earlier, states and counties, as modern businesses, are presumed to have access to telephones and fax machines, as well as Internet access and email servers, and the protocols reviewed support this presumption. Of greater interest,

⁴²⁶ Federal Emergency Management Agency, *NIMS and the Incident Command System*.

⁴²⁷ Ibid.

⁴²⁸ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 104.

are other systems or mechanisms that agencies employ, such as the use of after-hour phone numbers, cell phones; electronic mail, computer-based tracking systems or any effective or innovative forms of communication.

Beyond the more traditional phone, email, and fax communications, additional methods of official information transfer noted in protocols include:

- Conference calls
- Health Alert Network (or state version of the HAN)
- Red Book database (for agency and stakeholder contact information)
- Face-to-face communication
- Electronic data systems
- National Outbreak Reporting System (NORS)/eFORS database⁴²⁹
- U.S. mail
- 24-hour hotlines (phone number established solely for the purpose of reporting outbreaks)
- Pager
- Voicemail

Technology can fail, which is why it is prudent and essential to establish a redundant communication system, or establish ways to verify that the intended agency or person received a data transmission. Redundancy also has the added value of verifying a message's integrity and the sender's authenticity. For instance, Massachusetts requires a call to confirm the receipt for any reports sent via fax, and Kansas lists the state courier as an option to send or receive information. Kansas also has a 24-hour technical assistance contact, whereas Wisconsin has an established email address only for questions and updates for the outbreak manual.

When information is transmitted via email, the electronic correspondence should be manifested with a sent, received, or read notification. Confirmation of receipt is also

⁴²⁹ The data transmission tool that preceded *NORS* was called the electronic Foodborne Outbreak Reporting System (*eFORS*) from 1998–2008. “Foodborne Illness Surveillance, Response, and Data Systems.”

important when using databases; some systems allow users to audit the names of individuals who input or viewed information. Of equal importance is awareness when or if a specific notification method is or is not acceptable; in other words, whether or not notifications are required to be given directly to a live person, to assure the communication has been duly transferred.

Several states are utilizing the Internet for federal or state versions of the Health Alert Network, and/or for submitting notifications and reports to the CDC (eFORS; NORS, EpiNet). Moreover, within each regulatory agency or state, additional databases, intranet portals, file sharing or similar methods may be available that are not specifically referenced in their communication protocols. Low tech communication methods, such as bulletin boards, white boards, and memos, may be considered business-as-usual communication methods, and are not listed specifically as methods of emergent information exchange within an agency. With a variety of options for communications available, Kansas included several decision trees to assist stakeholders in the best mode for information exchange in a variety of outbreak situations.

1. Declaring an Outbreak

The CIFOR guidelines lay out the lead-in aspects of a foodborne outbreak, such as through surveillance and disease notification or other means. A jurisdiction may find it may have a situation that meets its definition for an outbreak.⁴³⁰ Based on the previously discussed definitions of foodborne outbreaks, if calls are received from multiple individuals who ate the same product or at the same place, it is feasible that a food product is involved. Therefore, when such a situation occurs, and points to a potential outbreak, investigative procedures call for a preliminary assessment.⁴³¹

Core elements of this assessment include verifying the diagnosis to establish the existence of an outbreak, typically through an analysis of victims' symptoms, medical

⁴³⁰ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 33.

⁴³¹ Ibid.

tests, and case histories. This review lays the foundation for categorizing individuals as cases through the formation of a case definition.

Arizona's protocols explain that noting that an outbreak is occurring can be concluded in a number of ways, such as reviewing the current number of cases and comparing a previous comparable period. It is important to see if the information available is not due to something other than an outbreak, such as reporting procedure changes, differences in case definition, how diagnostics were performed, or just increased awareness of the disease or reporting mechanisms. Checking on historical data trends and communicating with other jurisdictions to see if they are experiencing similar rates of disease can help to establish if the outbreak is real.⁴³²

Nearly every state itemizes the need to establish the existence of an outbreak as a primary step in its public health response, but falls short of stipulating how an investigating agency should declare an outbreak; if any difference or change in communication occurs, depending on the status of the outbreak.

Outbreaks are typically categorized in one of three ways, depending on the strength of available data:

- Suspect—An agency has opened an investigation into a suspect foodborne outbreak related to an event, or related to the consumption of a particular food.
- Probable—Investigation and patient interviews point to the increasing possibility of an outbreak.
- Confirmed—Lab results have verified a particular foodborne agent.

If the preliminary investigation points to the likelihood of a suspect, probable or confirmed outbreak, other local and state health professionals should be advised, based on a jurisdiction's protocols. Given the limited resources that often plague public health departments, it can be argued that heightened efforts or an enhanced search for additional cases may result if an outbreak is deemed to be real or valid, as opposed to suspect.

⁴³² Boston University School of Public Health, *Outbreak Investigations*.

The hesitation occasionally detected in declaring an outbreak is principally a product of distinguishing and authenticating the delineation between a disease cluster and an outbreak. Kentucky identifies that the CDC set down definitions for knowing if a disease is suspect, as well as probable and confirmed case identification parameters, and suggests that amending these definitions to fit current needs in the investigation may be helpful. Epidemiological evidence is the usual parameter that takes a situation from a suspect or probable outbreak scenario to an actual outbreak event. Once the epidemiological evidence points to an outbreak, the documents are in agreement that an outbreak should be declared. The mode of declaration of an outbreak is not as clearly specified by the states. What does declare mean? Checking a box on a form? Notifying staff? Assembling the outbreak team? Amplifying response? Advising other agencies? Based on the protocols reviewed, the interpretation of “declare an outbreak” is mostly ambiguous, and may depend on staffing and resources available, or be event specific.

With this in mind, the protocols were reviewed to ascertain the existence of any escalation protocols, and if the documents referenced an established chain of communication. In other words, after recognizing an outbreak, when does the identifying agency notify other public health professionals inside and outside of its organization that a food-related epidemic is occurring? The information at hand may point to an outbreak, but who is responsible for actually saying that a foodborne outbreak exists? If an individual, a team, or an agency declares an outbreak, who do they tell in turn? Is there a communication tree? Protocols were also reviewed to identify any points of escalation for notification; preliminary assessment vs. suspect vs. verified (from clinical specimens). None of the protocols reviewed included tiers of notification based on the intensity of the situation. Certainly, greater impact and urgency is given concerning the numbers of ill persons, and the severity of the illness.

Does response change based on the outbreak classification (suspect/probable/confirmed), or specific triggers like death or media interest? Who is responsible for declaring, and telling others? Most “declare” an outbreak only by definition; when the person/team/agency officially labels the situation an outbreak, does the communication flow change? A distinction does occur between declaring an outbreak vs. developing a

working hypothesis. Declaring a suspected outbreak is likely to trigger the involvement of the outbreak team.

When it comes to declaring an outbreak, New Jersey defines a benchmark for declaration, “when it is determined the increase in cases is real, and the diagnosis is verified, declare an outbreak.”⁴³³ However, most states’ protocols do not delve into announcing or “declaring” a confirmed outbreak in terms of how to communicate this information to others. Instead, they refer to *identifying* or *establishing the existence of* an outbreak; in other words, examining the data. Examples include North Dakota, which specifies, “If sufficient information indicates (an outbreak),”⁴³⁴ and Rhode Island “in the event a foodborne outbreak is suspected”⁴³⁵ Kentucky recommends that its outbreak team work together to determine if reported foodborne related illnesses should be investigated as an outbreak.⁴³⁶ Wisconsin denotes that an outbreak is likely by looking at the incidence of the disease in a particular group of people and matching it with a comparable previous time period or when point source outbreaks occur.⁴³⁷

Although the data and circumstances identify an outbreak, a person or persons are those who determine, or declare, that a foodborne outbreak exists. Protocols were examined to ascertain the inclusion of a communication chain describing how, who, and in what timeframe, are contacted when the existence of an outbreak is identified, and which other stakeholder agencies are notified.

2. Triggers for Communicating Outbreaks with External Partners

The progression of a foodborne outbreak, from initial notification through to the completion of final report writing, can be a constantly and rapidly changing scenario. All

⁴³³ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

⁴³⁴ North Dakota Department of Health, *Foodborne Outbreak Investigation Manual*.

⁴³⁵ State of Rhode Island Department of Health, *Guidelines for Investigating Foodborne Illness Outbreaks*.

⁴³⁶ Kentucky Cabinet for Health and Family Services, *Foodborne and Waterborne Outbreak Investigation Manual, Version 2*.

⁴³⁷ Wisconsin Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Manual*.

agencies will come to essential points in an investigation that call for the forwarding and sharing of information. Protocols reviewed for this research were checked to identify any standardized processes, including notification triggers and timelines, for sharing information with the next level of public health, as well as other local, state, and federal agencies, as recommended by the CIFOR:⁴³⁸

Establishing prompts for sharing critical information during an outbreak investigation can help prevent delays in response. CIFOR suggests standardizing processes for information sharing, including timelines and notification triggers. Further, CIFOR stresses the value of knowing which team member is responsible for communicating with other levels of public health, including federal, state, and fellow health agencies.⁴³⁹

Triggers can include elements that point to an outbreak of significance; an immediate health hazard to individuals or the community, widespread cases, a widely distributed food, an unusual agent, the exposed population subsequently dispersed, usual or suspicious circumstances, illnesses affecting children, death has occurred, or media attention. It is important to recognize that flexibility is needed; no two outbreaks are identical. However, an “as needed” approach may be too general a notion for passing on essential information.

The trigger of the suspicion of an outbreak has already been discussed. All states have some provision for the initial outbreak notification for a suspect, probable, or confirmed foodborne outbreak.

Few references in state protocols indicate as to what point an outbreak investigation would prompt notification of stakeholders outside the state agency umbrella.

Some states, like Kentucky and Wisconsin, included notification triggers in their lists of roles and responsibilities. Although some states include situational points that should prompt the forwarding or exchange of information, it was not observed to be a typically listed trigger or action step in state documents.

⁴³⁸ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 104.

⁴³⁹ Ibid.

Virginia lists triggers for when a food traceback and/or recall may be required. It ramps up communication to the state Bureau of Child Care if the event affects children. If a food traceback or recall are necessitated, communication may be escalated. Third, if enteric disease cases are associated with a hospital or hospital-based long-term care facility, this situation should trigger outreach to the state's Section for Long-Term Care regulation.⁴⁴⁰

Kansas has a list of triggers for suspicious incidents, where law enforcement is contacted:

- Environmental clues, such as reports of unusual color, odor, or appearance of food
- Evidence or tampering in food packaging
- Unusual agent or vehicle chemicals that do not belong at the site
- Sick or dead animals in the vicinity of the food preparation facility⁴⁴¹

Minnesota has the following communications triggers:

- Response to media inquiries
- Response to legal inquiries
- Public announcement or proactive notification of media regarding an outbreak
- Coordinating tracebacks with the state department of agriculture, FDA, USDA, and CDC, as appropriate⁴⁴²

In Texas, if a foodborne outbreak is suspected to stem from a meat or poultry product, it should trigger the investigator to phone the USDA regional compliance staff, and keep them apprised of the investigation status.⁴⁴³

⁴⁴⁰ Virginia Department of Health, *Foodborne Outbreaks*.

⁴⁴¹ Kansas Department of Health and Environment, *Foodborne Illness and Outbreak Investigation Manual*.

⁴⁴² Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*.

⁴⁴³ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*.

3. Sharing Information with External Partners

Although a health agency may report directly to the CDC, a report to a federal agency does not necessarily assure neighboring or affected communities are notified about the situation promptly. Agencies should proactively reach out to contact affected and neighboring health agencies in a timely fashion.

Outside of notifying other governmental public health agencies of the existence of actual foodborne outbreaks, as previously described, providing and receiving outbreak-related data is not always as simple as making a request. Privacy issues abound, which is why the CIFOR recommends an agency consider its strategies for sharing confidential information with other regulatory agencies.⁴⁴⁴ In addition to the information that can be shared, it is important for all the partners working on an outbreak response to know what information *cannot* be shared.

Privacy issues are a serious concern, and agencies are bound by federal HIPPA laws. Beyond this restriction, the protocols did not include much guidance on sharing ongoing outbreak information with external partners while an outbreak is active. It is another area in which it is difficult to distill out some of the guidance and procedures, as it may vary based on a states' structure; is a local health department considered an internal or an external partner?

Secure systems do exist for some sensitive private data, New Jersey's Communicable Disease Reporting and Surveillance System (CDRSS), for example. States that participate in the voluntary NORS database use this system to share information with the CDC. Texas uses a state database/electronic bulletin board that allows its Department of Health to inform other agencies of a possible outbreak, so that it is aware of the problem, and can report cases of similar illness. This bulletin board should post the existence of outbreak, ongoing findings, and final results. Also, as discussed at length in Chapter II, states and federal agencies can use a wide range of cores, nets, and electronic portals to share information securely.

⁴⁴⁴ Texas Department of State Health Services, *Foodborne Disease Outbreak Manual*.

Sometimes stakeholders and other agencies may become aware of an incident through the press or media coverage, and for this purpose, several protocols also have some guidance on what information should be included in such communications. Kentucky, for instance, includes a section on incident specific information dissemination.

The following incident-related information shall be disseminated using established information-sharing processes via communication systems or incident management software systems: type of incident, where the incident occurred, impacted area, the number people displaced or injured, identification of the triggering incident as suspect or confirmed, health and medical response capacity, impact, laboratory confirmation and case definition, as available, a request for public health and medical assistance, if required, resources for tracking the situation (links to applicable websites, etc.), and anticipation of public information or health guidance release to include recommendations for the public and copies of news releases.

As Louisiana's protocols indicate:

the media often obtain information from the public and expect to gain more information from the epidemiologists. Information already in the media is not confidential and can be discussed as long as the above guidelines (patient protection; HIPPA) are followed. When an outbreak has gained large media attention, it is useful to prepare an outbreak investigation summary limited to statistical results, sanitarians' inspection and common knowledge already in the media's hands.⁴⁴⁵

Minnesota errs on the conservative side. In general, Minnesota's outbreak notifications are shared only when necessary to alert potentially exposed individuals to seek medical attention or take other protective measures. In addition, information may be released if necessary to inform individuals who may be at risk of exposure, or who could expose others.⁴⁴⁶

⁴⁴⁵ Louisiana Department of Health and Hospitals, *Food-borne Outbreak Investigation*.

⁴⁴⁶ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*.

4. Barriers to Communication

Barriers to communication can detract from organizational effectiveness. No matter how streamlined a communication arrangement, transmission and receipt issues, administrative issues, message interpretation, and follow-through, are some factors that can inhibit an effective outbreak investigation and response.

For a situation as serious as a potential or actual outbreak, assuring the notification or required acquiescence of agency administration prior to action can be an obstacle to response. In addition, the failure to receive an acknowledgement of an information transmission can inhibit rapid response.

Territorial management and information hoarding are potential detractors, depending on the mindset of those holding knowledge that could or should be shared. In addition, written or unwritten internal policies or directives may limit the circumstances and content of forwarded data. Response can lag or move forward based on the ability to connect or confer promptly with designated supervisors or management levels. Slow or procrastinated approvals could also prevent essential information from reaching the appropriate parties in a timely fashion.

Despite all these potential barriers, very few protocols addressed these issues. Both Florida and Maricopa County had alternate steps to follow to connect with an appropriate person in case a regional epidemiologist or supervisor could not be reached. Minnesota provided instruction to contact the EH section manager or designated replacement in the absence of the EH outbreak coordinator.⁴⁴⁷

New Jersey acknowledges possible delays in reporting as a concern when discerning whether to declare an outbreak over. Further, the state suggests a retrospective outbreak response evaluation for stakeholders to consider how successfully the communication flow was maintained, in an attempt to improve the process continually.

⁴⁴⁷ Minnesota Department of Health, *Procedures for Responding to Foodborne Disease Outbreaks in Food Service Establishments in Minnesota*.

5. Declaring the Outbreak Over

In the mission to assure individuals are no longer becoming sick, it is expected that regulatory agencies continue with a foodborne disease investigation until an outbreak is concluded. An outbreak is considered over, as defined by the WHO, when the number of new cases has returned to background levels.⁴⁴⁸ Even after considering the outbreak over, public health officials need to keep an eye on disease incidence for up to several weeks to identify if cases begin to increase again. If that happens, the investigation is typically continued or restarted. Attribution in such cases could be due to incomplete control of the source, or that a secondary situation is linked to the first outbreak.⁴⁴⁹ If all the data show no new cases, the outbreak should be declared over and the public is then no longer considered to be at risk.

It is essential for all agencies that are part of the outbreak response to be aware of the end of an outbreak to wind down the investigation, coordinate final details, and combine descriptive and analytical epidemiology results for a final report. This essential step allows all involved to end the investigation and focus on recovery and the final report. However, only five of the 22 protocols reviewed commented on declaring an outbreak over or closed.

Maricopa County urges sending a follow-up closure letter to an implicated facility, but does not mention providing similar closure notification to other stakeholders. In addition, the County provides guidance for small outbreaks. Its manual conveys, “If number of reported ill is less than 5 persons, all ill persons have been interviewed by the health department, and there are no hospitalizations or deaths (confirmed by the contact person), then consult with supervisor about possibly closing the investigation.”⁴⁵⁰

New Jersey, while cautioning to allow for reporting delays, provides for declaring an outbreak over when no case that meets the investigation’s criteria is reported within

⁴⁴⁸ World Health Organization, *Terrorist Threats to Food: Guidance for Establishing and Strengthening Prevention and Response Systems*, 3.

⁴⁴⁹ “Investigating Outbreaks,” accessed September 9, 2015, <http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/investigations/decision.html>.

⁴⁵⁰ Arizona Department of Health Services, *Foodborne and Waterborne Disease Outbreak Investigation Resource Manual*.

two incubation periods. North Dakota combines descriptive and analytical epidemiology results in its determination of outbreak conclusions, while the state of West Virginia continues to monitor the situation until the outbreak investigation is closed. Wisconsin follows an “all clear procedure,” but only for boil water and unsafe water situations; no mention of when or how to declare a foodborne outbreak over is included in the document.

With the exceptions just listed, the protocols reviewed did not include any forms, sample wording, or distribution guidelines for declaring the finalization of an outbreak.

6. Reporting and Communicating Findings

Providing data to other agencies is especially important and notably difficult while an outbreak is being investigated. Sharing or releasing the results of an in-progress outbreak investigation is best accomplished with an agency lead, to centralize the process and allow a health agency to speak with one voice and one message. States were reviewed to ascertain any procedures in place to release information among public health partners, or to the public in general, in ways that minimize the risk of miscommunication or prevent the dissemination of protected information. The CIFOR suggests identifying an agency lead responsible for interactions with other agencies and advocates, “the establishment of procedures for coordinating communication with partner stakeholders to provide consistent messaging and accurate information flow.”⁴⁵¹

Florida chooses to centralize the provision of information by assigning an outbreak liaison to handle communication with other agencies. Maricopa’s *Outbreak Investigation Guide* contains a checklist, which specifically identifies communication steps. New Jersey ensures procedures for maintaining communication and information exchange, as well as decision making, media messages, outbreak updates, and more. Kentucky prescribes its incident-related information shall be disseminated using established information-sharing processes via communication systems or incident management software systems. Texas refers to its electronic bulletin board and database.

⁴⁵¹ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 104.

Developing a communication plan that identifies an organizational communication lead will streamline efforts to assure the transfer of consistent information to stakeholders, as well as reduce the potential for rumors. These actions can contribute to the sustainability of good working relationships after the conclusion of the outbreak response.

Combining and evaluating all aspects of the outbreak investigation to summarize essential components of the case effectively is not easy. Written outbreak investigation summary reports are mandated by 13 of the states. Completion of the CDC summary outbreak form is desired by Maricopa County, North Carolina, and West Virginia.

Several states have guidelines to assure their reporting goes through a series of reviews prior to release. The completed report is then required to be provided to the respective state lead and/or the CDC. The CIFOR parallels this guideline in its recommendation for public health agencies to assure standardized forms are used for every outbreak to assure pertinent information is recorded and shared in the appropriate state and national outbreak databases.⁴⁵²

It is presumed that reports are written to share findings; so ideally, states should use a format that can be shared with other stakeholders, even if it is just an executive summary with key data points. Several states have a format for the final report or stipulate using scientific format in the writing. Arizona has an extensive listing on how to prepare a summary report, and Kentucky has an entire chapter on after action reports and components. Alabama seeks input from other state outbreak stakeholders for validation of the information contained in the report, and Minnesota includes its team members for comment on the written report. Before distribution of the final report, Alabama sends the draft report to the outbreak team for validation of the information relating to the outbreak investigation and findings, after which it is reviewed by the director before final submission to the state epidemiologist. Florida looks to assure the appropriate personnel will review and forward reports to state and federal agencies.

⁴⁵² Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 104.

Final outbreak reporting may be subject to additional administrative scrutiny approvals or varying tiers of clearance due to HIPPA and similar privacy protection requirements:

- Investigation team
- Official use (state, fed agencies)
- Public

The IAFP suggests that multijurisdictional outbreak reporting should be coordinated with other responding stakeholders. It continues to suggest a hot wash or debrief of all relevant stakeholders to assure all lessons learned are captured, memorialized, and shared. The final report should be as complete as possible. In the interest of fairness and continuing cooperation, due credit should be given to all investigation participants. Lastly, copies of the final report should be accessible to all, and shared with the respective state agencies.⁴⁵³

Where included in the protocols, access to the final report and distribution lists are sent to state and federal agencies of concern. The approved final report should be distributed to all agencies that contributed to the investigation effort, and all local staff involved. Missouri and North Dakota both agree with this level of distribution, and suggest the approved final report be distributed to all agencies that contributed to the investigation effort. Alabama shares its reports by posting them on its resources webpage for involved state staff and also makes them available to the public upon request. Alabama guidelines also propose holding a meeting with those involved to review the report, and if a facility is involved, to schedule a meeting with them or call them to review the report. Kansas recommends that findings from the investigation be shared with the investigation team by the lead food inspector. This point person is also obliged to provide a copy of the final report to the corresponding local health department and the state epidemiological services.

⁴⁵³ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 75–76.

Oral briefings, appropriate for audiences who cannot or will not read an entire report, are required by New Jersey and West Virginia. The oral briefing is assembled primarily for the outbreak team and others involved in the investigation, and may include the public or the media. Louisiana suggests an appropriate summary be shared with the public when a foodborne epidemic is being followed by the media, and expects the summary report will be prepared by a member of the outbreak team. In addition to a written summary for each individual outbreak, West Virginia also annually summarizes all state outbreaks and lessons learned.

Health agencies are expected to report the findings of an outbreak investigation, upon completion, to state health authorities and to the CDC for informative reasons. It also allows the federal agencies to update best practices and to add to the current public health body of knowledge on outbreaks. The final outbreak summary report should be widely shared to meet this goal, and can be accomplished through any combination of the following: email distribution, posting in a database, public meetings, press release/press conference, submission to professional journals, or presentations at conferences.

States that specify the content of a final report have similar requirements, which are aggregated as follows. Content of the written report should include:

- Name
- Municipality and location
- Name of disease-suspect disease-cause of problem
- Background
- Initiation of the investigation
- Key investigators
- Epidemiological, environmental and laboratory data
 - Number ill
 - Date of onset
 - Description of symptoms
 - Pertinent medical history and available diagnostic confirmation

- Investigation method
- Investigation results
- Summary of any site visits conducted
- Outbreak investigation activities
- Analysis and interpretation of data
- Summary of recommendations
- Discussion
- Copies of any resources created or distributed (e.g., press releases, letter to parents, surveys)
- Contact information for key contacts at facilities involved in the outbreak
- Include only statistics, information from the environmental assessment, and knowledge already covered by the media
- Report authors

In addition, several states require the completion of CDC form 52.13,⁴⁵⁴ a standardized form used to report enteric foodborne outbreak investigations, for input into the NORS database. West Virginia indicates the state will report selected outbreaks to the CDC. Four require the completion and submission of standardized state forms. Kansas also requires the completion of a Hazard Analysis Critical Control Point (HACCP) inspection report. West Virginia requests the findings of outbreak response activities as soon as possible, if the state had lead responsibility.

Several states continue the team approach through the final report before it is declared “final.” Kansas requires a written report of the lead agency if resources allow. Minimally, they should provide the outbreak team lead with pertinent relevant information so an end-of-outbreak report can be completed at that level. Minnesota requests written reports for probable, as well as confirmed outbreaks. Louisiana suggests a “hot-wash,” a post-exit conference with staff and RRT members, held for purposes of review, and to evaluate efficacy and appropriateness of the outbreak response activities.

⁴⁵⁴ “Forms and Guidance,” accessed November 10, 2015, <http://www.cdc.gov/nors/forms.html>.

The timeframe for completion and submission of final reports, where indicated by seven states, ranged from 28 days (Alabama) to 90 days (Missouri), with a mode of 30 days. West Virginia's timeframe was not as specific, but does request submission as soon as possible.

Written format is the most common mode of documenting and sharing the overview of an outbreak to describe what an agency found, what actions were taken by the agency, and recommendations for further action. As the IAFP explains, the lead agency overseeing the outbreak response should create a narrative report, including a summary of all outbreak data, and points that lead to response decisions.⁴⁵⁵ This communiqué ideally contains an accounting of specific outbreak activities, recommendations provided, and how effective these interventions were in ending the string of disease, actions taken or recommended, and the effectiveness of these actions.

Ideally, agencies have a format that can be shared with other states, health departments and stakeholders, even if it is an executive summary with key data points. The written report serves as a performance assessment, a reference for future outbreaks, and a document for potential legal issues. Agencies should also consider publishing findings in peer reviewed journal, to share lessons learned.

7. Communication Training

As with any professional proficiency, training is essential to assure situations encountered are handled competently, and to recognize and address barriers, including communication.

The existence of agency protocols for handling a foodborne outbreak is purposeful, but a guidance document in and of itself does not necessarily increase the skills of the professionals using it. If outbreaks occur infrequently in an agency, the application of essential response steps may be a perishable skill. Training functions as a tool to improve the efficiency, knowledge, and skills of a workforce, helps to reduce

⁴⁵⁵ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 75–76.

mistakes, strengthens response, and in the case of outbreaks, can reduce the incidence of disease and death.

In this regard, the CIFOR recommends:

Team members should be trained in the agency's outbreak response protocols and their role on the team. Training can be provided through established classroom and self-study courses but is likely to be more effective when interesting and provided through team and interagency exercises, on-the-job training during a real-life investigation, and debriefings after each outbreak investigation.⁴⁵⁶

The IAFP extrapolates this concept further:

Develop the skills of the staff assigned to outbreak response so that they can carry out their role effectively during an investigation and teach them procedures to interpret data collected during investigations. Conduct seminars routinely, and during or after investigations, to update staff and keep agency personnel informed. Train office workers who receive calls concerning foodborne illnesses to give appropriate instructions. Those who participate in the investigation will learn from the experience and often are in a position to implement improvements after the investigation is completed.⁴⁵⁷

While these recommendations are not specific to communication, they all include interdisciplinary communication and coordination as a foundational tenet. However, despite the authoritative recommendations for foodborne outbreak response training, less than half (nine out of 22) of the documents audited for this study included any reference to the training of staff.

Several alluded to the value of previous outbreak response experience. Iowa, for example, conveys that by conducting “routine” foodborne illness investigations, agencies are better prepared to investigate and control outbreaks, and considers foodborne outbreak response experience as training for more serious, more widespread outbreaks. Although experience is a great teacher, more formal training may provide essential infrastructure. West Virginia brings this topic to light by stipulating, “this investigation

⁴⁵⁶ Council to Improve Foodborne Outbreak Response (CIFOR) and Council of State and Territorial Epidemiologists, *Guidelines for Foodborne Disease Outbreak Response*, 26.

⁴⁵⁷ International Association for Food Protection (IAFP), *Procedures to Investigate Foodborne Illness*, 5.

protocol is *not* a substitute for training and experience in outbreak investigation. Consult an experienced trained epidemiologist for complex outbreak investigations.”⁴⁵⁸

Other states make note of staff instruction, but provide vague direction on where or how to obtain training. Wisconsin instructs the state agency to provide foodborne outbreak training materials, and advises that local health departments can prepare by training personnel in data collection procedures, such as line lists, questionnaires, and the use of databases. Massachusetts provides links to CDC materials. Similarly, Arizona asserts that pre-outbreak education is valuable to assure knowledge and application on essential procedures, including a questionnaire provision and how to handle clinical specimens. The National Food Safety System Project opines that additional training of public health professionals is necessary for expanded surveillance and necessitates resources at local, state, and federal agencies.⁴⁵⁹ Missouri agrees, and further explains that public health professionals should prepare for an outbreak before it occurs by training staff, and lists epidemiologic resources for such training. Florida mentions its departmental training, and advises staff to follow all the procedures for learning during this education when investigating complaints of illness. Florida also offers training to its public health partners, “at the county health department’s request, your Regional Environmental Epidemiologist is available to present training to both large and small county health department groups on any of these subjects.”⁴⁶⁰

For maximum benefit, training for each individual with duties in outbreak response should be continuous and needs to emphasize cooperation, coordination, and essential teamwork both within an agency and with external partners. New Jersey was the only state to specify timeframes for training and training updates to “ensure that all outbreak response team personnel are properly trained. Provide, review and update

⁴⁵⁸ West Virginia Department of Health and Human Resources, *General Outbreak Investigation/Notification Protocol*.

⁴⁵⁹ National Food Safety System Project, *Multistate Foodborne Outbreak Investigations Guidelines for Improving Coordination and Communication*.

⁴⁶⁰ Florida Department of Health, *Food and Waterborne Disease Surveillance and Investigation*.

training at least once a year for all staff and within 30 days of hire date for new employees.”⁴⁶¹

Notably absent from all the protocols, except New Jersey, was the provision of trainings with stakeholders (health care providers, schools, media, etc.). New Jersey suggests that to help manage outbreaks, local health departments should routinely educate health care professionals and administrators in their respective jurisdictions about their obligation to report incidents of communicable diseases.

Other beneficial aspects of training, such as foodborne outbreak exercises, needs assessments, and program evaluations to capture learning effectiveness, relevancy and gaps for continuous quality improvement, were not included in the text of any of the states’ documents.

⁴⁶¹ New Jersey Association of County and City Health Officials et al., *Communicable Disease Outbreak Manual*.

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IV. CONCLUSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

In responding to foodborne outbreaks, effective communication guidelines and strategies are essential for public health agencies to assure situational awareness and interoperability. Based on the content of the states' foodborne outbreak protocols reviewed for this research, this chapter provides conclusions, a summary of recommendations, and several suggestions for additional study.

A. CONCLUSIONS

Continuously improving interagency coordination and communication is a goal that is fundamental to increasing the effectiveness of this nation's food safety systems.⁴⁶²

This study sought to identify routes of internal and external state agency communications and categorize how information is exchanged between public health agencies during foodborne outbreak response. Commonalities exist within response frameworks and protocols adopted by states to assure core investigate principles are met. However, no "one size fits all" exists when it comes to coordinating and investigating epidemics related to food consumption. Professionals within each state follow their respective outbreak guidelines as personnel and resources allow. However, even within established protocol architectures, regular review and updates are essential to assure communication barriers are identified and addressed. The information laid out in this document provides a behind the scenes look at areas in which breakdowns in correspondence might occur during outbreak investigations and response.

Attention to information transfer was apparent in the collective patterns of the states, as identified in their response activities, although observable variations occurred from agency to agency. Exacting procedures for communication exchange, specifying who is responsible for transmitting what information to which public health colleagues via what mechanism(s) within a defined time interval, is not universally documented in

⁴⁶² Stuart A. Capper and Arthur P. Liang, *Interagency Coordination and Communication during Multi-state Foodborne Disease Outbreaks* (unpublished, 2011).

outbreak functions. While steps in communicable disease investigation activities need to be broad enough to remain nimble and innovative for purposeful response, the lack of specificity in information transfer activities can lead to unintentional delays in protecting public health.

Direction for foodborne outbreak response exists in collaborative proceedings, such as the CIFOR guidelines; however, exact assignments for managing outbreaks are state-specific. This study documented the range of response procedures in existing protocols among many of the states. The variability in states' approaches was conspicuous, especially in the areas of outreach and communication. Coordinated response, most notably in multi-jurisdictional foodborne outbreaks, can best be attained if all players are working with the same playbook. Just as the FDA *Food Code* is a model document that states are strongly encouraged to adopt for synergy in protecting the food supply, the CIFOR guidelines should similarly be widely endorsed and adopted by all states for functional coaction in outbreak response.

The comparative analysis of the states' foodborne outbreak protocols identified that strategies used by states for information exchange have similarities. All recognize the value of prompt response in identification, investigation, and control. To some extent, all reviewed states mention prompt communication, and identify aspects of information exchange during investigation activities. Epidemiologists, environmental health specialists, and public health nurses are considered core personnel when handling an outbreak. A team approach is mentioned by many, but not all states. However, the inclusion of other public health professionals, such as laboratory professionals, and health educators, are not universally documented as valued assets to the outbreak response team, for routine or larger-scale epidemics.

Analysis of the states' response protocols also pinpointed areas for improvement in communications. Reference to the ICS is lacking in all but a few states' documents. Communication directives are often broad, to allow for flexibility in response. Statements, such as "communicate often, early and accurately," while credible, could benefit from specificity, and the inclusion of more measurable response objectives. Establishing a communications lead to assure absolute clarity about the outbreak situation

at all times can address this responsibility. A well-designed communication plan with a focal spokesperson helps to prevent unnecessary duplication, mixed messages, and avoidable delays. This area should be formalized in written response plans. Having clearly defined methods for intra-agency information exchange and maintaining close communication among those included in outbreak interventions is fundamental in assuring a coordinated response. While established guidelines may be generalized to allow for situational flexibility, enough specificity is necessary to assure appropriate and timely notifications to all who should be included in the outbreak response conversation.

As foodborne outbreaks are often a rapidly evolving, and sometimes confusing situation, all agencies should maintain a written, defined, specific, clear, and understood communication plan as part of their foodborne outbreak protocols to reduce the likelihood of two-way information transmission delays with public health. Up-to-date contact information sheets, and clear directions on when and how to distribute information to the core team, and to internal and external partners, should be core components of planning documents. The interplay of people and agencies involved in a local or state response necessitates all public health response staff be trained on how information needs to be exchanged, how this exchange will occur, the person or agency responsible for the message delivery, and how to confirm the message has been received and understood. Designating key staff for inter- and intra-agency communication helps to ensure work is not being done in isolation. As outbreak response teams may vary in different jurisdictions, roles and responsibilities may overlap. Communication guidelines should specify how to incorporate partners that could be involved, and outline when and how to share specific information.

B. RECOMMENDATIONS

In responding to foodborne outbreaks, effective communication guidelines and strategies are essential for public health agencies to assure situational awareness and interoperability. Based on the content of the states' foodborne outbreak protocols reviewed for this research, a summary of recommendations is provided.

1. Review and Update of Outbreak Communication Protocols

Outbreak response protocols are the guidance documents for systematically investigating disease clusters in a public health agency. As such, they should be timely, accurate, and relevant to current practice. While some of the protocols obtained for this research were created or updated within the past three years, some date back as far as 1998. Any organizational guidance documents require review and maintenance to be effective. In any given year, organizational needs may change, laws may be created or revised, and staff and/or resources may be reallocated, which supports the obligation for regular audits and updates.

It is strongly recommended that all jurisdictions conduct this review and update their procedures on an annual basis. It is especially imperative for those agencies with older documents to urgently scrutinize and update their procedures to assure the best possible response to an outbreak.

Lessons learned from the experience of responding to cases of disease, the rapid pace of new technologies, and lessons learned from localized or multi-regional outbreaks can change how and when information is exchanged, and states should regularly look towards adapting to new situations. Protocol revisions may be spurred by problems encountered during actual response; review and assessment of communications post-event can provide essential components for continuous quality improvement.

As a result of potential organizational or staff changes, each protocol document should list an author or contact who can be reached for questions or updates. When identifying other documents or resources, protocols should include a specific location where the reference may be found. For instance, “See directory” should be listed as “see directory, located in the XYZ database.”

In addition, regular review and update of guidelines can help assure staff familiarity with localized processes, and individual and departmental expectations and responsibilities in foodborne outbreak response. These documents should include a date of last revision, to help assure the staff is working from the most current protocols.

2. Communication Enhancements

Coordinated response, especially in multi-jurisdictional foodborne outbreaks, can best be attained if all personnel are working with the same playbook. Just as the FDA *Food Code* is a model document that states are strongly encouraged to adopt for synergy in protecting the food supply, the CIFOR guidelines should similarly be widely endorsed and adopted by all states for functional coercion in outbreak response.

Communication is an essential element in outbreak investigations. In addition to including planning components from the CIFOR guidelines, states' plans should also incorporate prescriptive, but flexible elements to optimize the use of operational resources and assure enhanced information transfer.

Formal communication checklists can provide a quick reference for the information distribution chain within and between public health personnel and agencies. In other words, which public health professional is responsible for transferring what information to which recipient, using what communication methods, under what circumstances? Thus, each public health agency should assure its response plans establish a communication liaison and backup to guarantee the coordination of information flow. To accompany the checklist, communications logs should be used to assure the documentation of information transfer. It is important to review and update these checklists as necessary after each outbreak event.

Outbreak response plans need to include a phone tree, or a modern communication flow chart. This communications network should incorporate sufficient redundancy to address any difficulties in tracking down specific people and to ensure messages still get through if one person cannot be reached.

As electronic communication systems and Internet-based tools are updated, so should all agencies adapt their plans to incorporate the most modern, rapid, and acceptable means of information transfer. Procedures also should be cognizant of the need to handle confidential information, and specify what information can be shared and ways to assure data protection.

Although the federal government cannot mandate the adoption of certain protocols, it could require the existence of a robust foodborne outbreak response document—complete with a communication plan—as a prerequisite for the receipt of any federal grant monies.

3. Incident Command System

Public health agencies throughout the United States, to maintain compliance with NIMS, are required to utilize ICS principles to coordinate public health emergency responses. As the ICS is a national standard for communication during emergencies, and provides the structure for management, reporting, and response, use of this system should be stipulated in the text of every outbreak action protocol. The ICS can provide for an organized response, especially when entities, such as public health agencies, have limited resources. Familiarity with ICS principles and widespread application during foodborne outbreaks can help prevent or solve a variety of communication concerns in multi-disciplinary and multi-agency response.

4. Regionalized Expertise

Local health agencies are the first line of defense in foodborne outbreaks. Despite this level of defense, resources and multi-disciplinary personnel are often strapped at this level. A regionalized approach for food safety expertise is a prudent way of addressing this gap, and the federal government has appropriated funding for cooperative agreements in this area. The USDA currently funds six integrated food safety centers of excellence (COE) and the FDA has provided support for the food protection RRTs in 14 of their districts.⁴⁶³ Given the geographical expanse of the United States, these regional entities have substantive areas to cover. Ideally, every state should have its own RRT for more rapid response and coordination of outbreaks. Funding for additional COEs and RRTs to create a more robust regional approach would provide additional resources to assist with the burden of foodborne diseases, and allow for the greater integration with the thousands of local health agencies serving the nation.

⁴⁶³ “Rapid Response Teams,” accessed November 5, 2015, <http://www.fda.gov/ForFederalStateandLocalOfficials/CooperativeAgreementsCRADAsGrants/ucm297407.htm>.

5. Training

As illustrated in this research, many professional disciplines and professional competencies are involved in the investigation and control of communicable diseases stemming from the food supply. Assuring the skills of the public health workforce in outbreak response is core to a rapid and integrated response to foodborne outbreaks.

To keep pace with current standards, recurring training must be readily available to all persons working in a public health agency. Health agencies should be encouraged to provide instruction and practice on interdisciplinary outbreak response, and reduce barriers to collaboration and communication. Such training should be offered not only to the primary outbreak response professionals (environmental health specialists, epidemiologists and laboratory personnel), but also to specialized professionals (health education, public health nurses) and administrative and support staff, so they can be prepared to act and assist when a large-scale outbreak occurs. Communication tools and a variety of outbreak training resources need to be widely available in resource databases, such as provided by COEs and the CIFOR. Non-governmental organizations serving public health professionals should be encouraged to create and provide regular outbreak communication trainings for both introductory purposes and for skills maintenance. Local, state, and national communication drills are needed to identify gaps, and assure all players are familiar with communication tools and processes. Each health agency, within its own policy manuals, should assure every new employee receives foodborne outbreak communication training, and when employees are promoted or reassigned.

Funding opportunities for training and enhancements are often targeted at state-level agencies or health departments of larger cities and states. Such opportunities should be more widely available to smaller health agencies, to identify and create best practices from a bottom-up approach.

C. SUGGESTIONS FOR FUTURE RESEARCH

This research reviewed outbreak response protocols from a number of states to ascertain communication processes used during foodborne outbreak response. Although a picture of communications from state health agencies has been framed, additional areas could benefit from further research.

Although many states have formalized procedures for outbreak response, these documents are not aggregated into one location. Further, no data exists to identify which local health departments have official frameworks to follow during foodborne outbreaks or intentional contamination of food supplies. Gathering and reviewing this information can provide a detailed picture of the status of preparedness for food emergencies.

Public health is not singular in its information-sharing challenges. Law enforcement shares similar sensitivity with its communications. Comparing and contrasting information-sharing systems and protocols from law enforcement and public health may identify best practices that can address existing barriers.

Many electronic portals exist for information transfer between public health agencies. Identifying all the computerized systems, their commonalities, differences, and security features may lay some groundwork for functional consolidation and synchronization.

Lastly, no known studies assess the strength of the communication chain from federal agencies to states to local health agencies. Ascertaining how rapidly and effectively information flows in all directions, from top down, bottom up, and laterally, can identify gaps and areas for improvement in communication.

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